LUXURY TOWERS!
We test five PC cases that raise the bar for features—and functionality. *p. 36*

MASTER YOUR MEDIA
Build a powerful custom front end for your music, movies, and more. *p. 57*

First Fusion CPU Tests
AMD's newest CPU puts the heat on Intel—full Lab results inside. *p. 8*

MAXIMUM PC

MINIMUM BS • JANUARY 2011 www.maximumpc.com

32 Ways to Protect Your Digital Life

Be your own Data Defender!
Guard your info, your identity, and your money today

No half measures here. You're either a Data Defender or you're not.

WINDOWS PHONE 7 VS. THE WORLD
Microsoft muscles up with a surprisingly awesome OS. But can it out-class Android? *p. 46*

BUILD YOUR OWN NEXT-GEN SERVER
It's tiny, powerful, and affordable! Step-by-step details inside. *p. 64*

$8.99US
01
0 70989 38753 9

Future
MEDIA WITH PASSION

Google TV: Is it really ready for prime time? *p. 84*

JANUARY

FEATURES

22 Defend Your Data
Want security? Here are 32 ways to make your digital life safer.

36 Mid-towers with Style
We put five of the latest and greatest mid-tower cases to the test.

46 Windows Phone 7
Microsoft's contender in the smartphone market: what it's got and what it needs.

36

DEPARTMENTS

Quickstart

08 **NEWS** AMD Fusion; Nvidia GTX 580.

14 **THE LIST** Apple's 8 Greatest Mistakes.

16 **DEATHMATCH** USB 3.0 vs. eSata.

R & D

54 **WHITE PAPER** HDBaseT: One Ethernet cable for HDMI, power, and data across 100 yards.

55 **AUTOPSY** Inside an IBM PC Model 5150.

57 **HOW TO** Organize your media with XBMC.

64 **BUILD IT** A next-gen Windows Home Server.

In the Lab

73 **REVIEWS**

92 **LAB NOTES**

96 **BEST OF THE BEST**

LETTERS

20 **DOCTOR**

94 **COMMENTS**

MAXIMUM PC

EDITORIAL
Editorial Director: Jon Phillips
Editor in Chief: George Jones
Deputy Editor: Katherine Stevenson
Senior Editor: Gordon Mah Ung
Reviews Editor: Michael Brown
Senior Associate Editor: Nathan Edwards
Online Managing Editor: Alex Castle
Online Features Editor: Amber Bouman
Online Associate Editor: Alan Fackler
Contributing Writers: Loyd Case, Nathan Grayson, Tom Halfhill, Paul Lilly, Thomas McDonald, Quinn Norton, Zack Stern
Copy Editor: Mary Ricci
Podcast Producer: Andy Bauman
Editor Emeritus: Andrew Sanchez

ART
Art Director: Natalie Jeday
Contributing Art Director: Boni Uzilevsky
Photo Editor: Mark Madeo
Associate Photographer: Samantha Berg
Contributing Photographer: Patrick Kawahara
Cover Illustrator: Adam Benton

BUSINESS
VP Tech and Living/GM: Kate Byrne, kbyrne@futureus.com
National Sales Director: Jane Evans, jevans@futureus.com
Regional Sales Director: Anthony Losanno, alosanno@futureus.com
West Coast Sales Manager: Greg Ryder, gryder@futureus.com
East Coast Account Executive: John Ortenzio, jortenzio@futureus.com
Integrated Sales Director: Joe Pomparelli, jpomparelli@futureus.com
Senior Marketing Manager: Andrea Recio-Ang, arecio-ang@futureus.com
Marketing Associate: Robbie Montinola, rmontinola@futureus.com
Advertising Coordinator: Jose Urrutia, jurrutia@futureus.com

CONSUMER MARKETING
VP Consumer Marketing: Rich McCarthy, rmccarthy@futureus.com
Circulation Director: Crystal Hudson, chudson@futureus.com
Newsstand Director: Bill Shewey, bshewey@futureus.com
Consumer Marketing Operations Director: Lisa Radler, lradler@futureus.com
Renewal & Billing Manager: Mike Hill, mhill@futureus.com
Sr. Online Consumer Marketing Director: Jennifer Trinkner, jtrinkner@futureus.com
Customer Service Manager: Mike Frassica, mfrassica@futureus.com

PRODUCTION
Production Director: Michael Hollister
Production Manager: Larry Briseno
Senior Production Coordinator: Dan Mallory
Print Order Coordinator: Jennifer Lim

FUTURE US, INC.
4000 Shoreline Ct., STE 400, South San Francisco, CA 94080
Tel: 650-872-1642, Fax: 650-872-2207
Email: comments@maximumpc.com
Website: www.maximumpc.com

President: John Marcom
VP/CFO: John Sutton
Director of Human Resources: Nancy Durlester Dubois

SUBSCRIPTIONS
To Subscribe: Tel 800-274-3421
www.maximumpc.com/customerservice
Maximum PC ISSN: 1522-4279

Customer Service: Tel 800-274-3421
www.maximumpc.com/customerservice

BACK ISSUES
Tel 1-800-865-7240

REPRINTS
Reprint Management Service – 717-399-1900, ext. 100

Future produces carefully targeted magazines, websites and events for people with a passion. We publish more than 180 magazines, websites and events and we export or license our publications to 90 countries across the world.

Future plc is a public company quoted on the London Stock Exchange.
www.futureplc.com

Chief Executive: Stevie Spring
Non-executive Chairman: Roger Parry
Group Finance Director: John Bowman
Tel +44 (0)20 7042 4000 (London)
Tel +44 (0)1225 442244 (Bath)

©2010 Future US, Inc. All rights reserved. No part of this magazine may be used or reproduced without the written permission of Future US, Inc. (owner). All information provided is, as far as Future (owner) is aware, based on information correct at the time of press. Readers are advised to contact manufacturers and retailers directly with regard to products/services referred to in this magazine. We welcome reader submissions, but cannot promise that they will be published or returned to you. By submitting materials to us you agree to give Future the royalty-free, perpetual, non-exclusive right to publish and reuse your submission in any form in any and all media and to use your name and other information in connection with the submission.

Who Is Your Family's Chief Security Officer?

I confess that when Gordon and Katherine pitched me this month's cover story, I was skeptical. Then I started researching the frequency of identity fraud, and, holy cow! In 2009, according to Javelin Strategy and Research's annual "Identity Fraud Survey Report" (http://bit.ly/aKgBRe), 11.1 million adults were victims of identity fraud. 11.1 million people! That's almost five percent of the total population of the United States.

It gets worse. The monetary damage from all this fraud was $54 billion, representing a mean average of $4,841 per victim. According to this survey, small business owners are particularly vulnerable—they suffered identity fraud at one-and-a-half times the normal rate. All of this is outrageous. If I told you that you had a 5 percent chance of being robbed when going to the ATM or bank, you'd never go. (Of course, you could easily argue that paying $3 to withdraw cash from an ATM is robbery in and of itself, and you'd get no argument from me.)

When I read reports like this, I release some of the steam accumulating between my ears by fantasizing about fighting back against identity thieves. Wouldn't it be great if there were some way to phish the phishers and take *their* money? Or if there were ways to set up a digital decoy account that you could use to trap and zap would-be thieves? Yes, that's what the FBI is for, and if you found yourself wondering what the hell a superhero is doing on this month's cover of *Maximum PC*, now you know.

I also can't help but think that most of this fraud is preventable. Realistically, it's not like all the data we have floating around the web, our multiple PCs, our home networks, our phones, and our wallets is going to decrease over time. This makes it more important than ever that you and I assess our data security on at least a yearly basis. If you're reading this magazine, chances are that you serve as an ad hoc IT advisor to your friends and family. It's time to give yourself another title: Chief Security Officer. Preach the mantra of digital security, please. After all, $54 billion is a lot of cash.

THE OVERSEER'S OPTIONS

AMD's Fusion
page 8

Luxury PC Cases
page 36

DIY Windows Home Server
page 64

LETTERS POLICY Please send comments and questions to george@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, George is unable to respond personally to all queries.

THE NEWS

Fusion: AMD's Atom Smasher

Hands-on preview of AMD's first 'Accelerated Processing Unit' —GORDON MAH UNG

Nuclear fusion involves smashing small atoms together to release incredible amounts of power. That's likely what AMD hopes to unleash when its next-generation Fusion processors hit the street in early 2011.

Dubbed an Accelerated Processing Unit, or APU, Fusion fuses one or two x86 cores with a fairly powerful graphics core in an effort to dominate Intel's popular but woefully underpowered Atom chips. And while it can't take on the mighty Nehalem-microarchitecture chips in x86 performance, Fusion can definitely apply a serious amount of pain to Intel's Achilles' heel in the form of integrated-graphics performance.

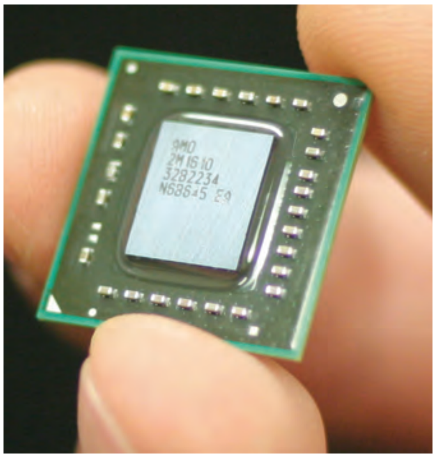
Four Fusion chips will initially be offered in the "Brazos" family, featuring single- and dual-core configurations: Two "Zacate" chips and two "Ontario" chips. Different core clock speeds as well as GPU clocks will differentiate the chips, as will power consumption.

Fusion's CPU is nothing too revolutionary from a pure x86-performance perspective. The company freely admits that the pair of x86 cores in Fusion offers about 90 percent the performance of an original Athlon 64. In fact, in some compute-intensive chores, Fusion may perform even worse since the core has been tweaked from a three-issue design to a two-issue design. In layman's terms that means the core is narrower than Athlon 64's. By comparison, one of the key performance advantages that Intel's Core 2 had over Athlon 64 (among others) was its wider four-issue core. AMD said it went with a narrower core design to reduce power consumption.

The company said an improved branch predictor and a "well-managed" out-of-order engine help keep the performance of the chip at better-than-Atom levels. And that's really the point of Fusion. These chips won't set the world on fire but they should outgun equivalent Atom parts.

But we digress. Ultimately, Fusion is not so much about x86 performance as it is about graphics. That's where AMD is putting its money in the first Fusion chips. Sporting a third-generation unified video-decoder core, DX11 capability, support for H.264, Divx, and Xvid, and housing 80 so-called "nanocores," the first Fusion chips will have roughly the graphics performance of a Radeon HD 5450.

That might not seem like much to a person rocking a Radeon HD 5970, but remember, we're talking about a mobile chip that's incredibly tiny. The x86 cores and GPU, along with the integrated memory controller, integrated PCI-E, and other platform interfaces measures roughly 75mm^2 on TSMC's 40nm process technology. Intel's current D-series Atom measures 87mm^2 on the company's 45nm process technology.

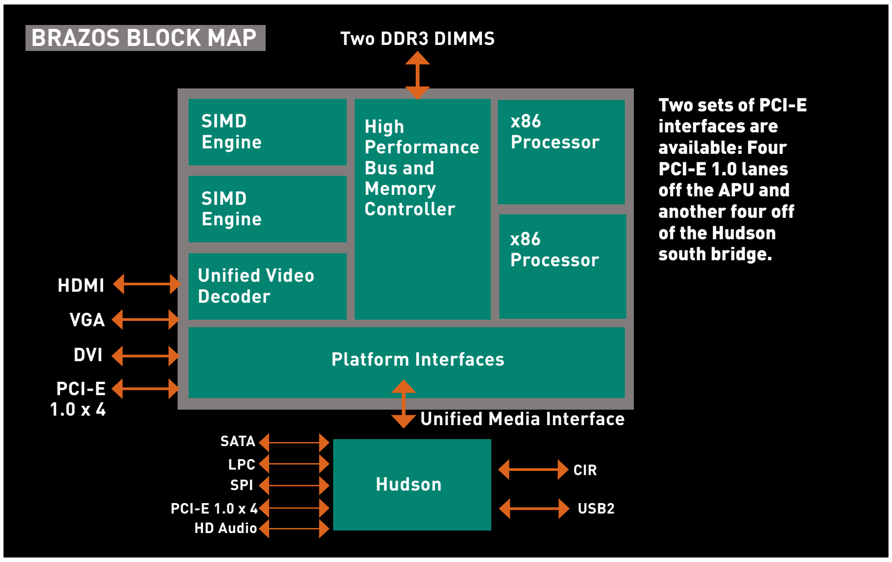


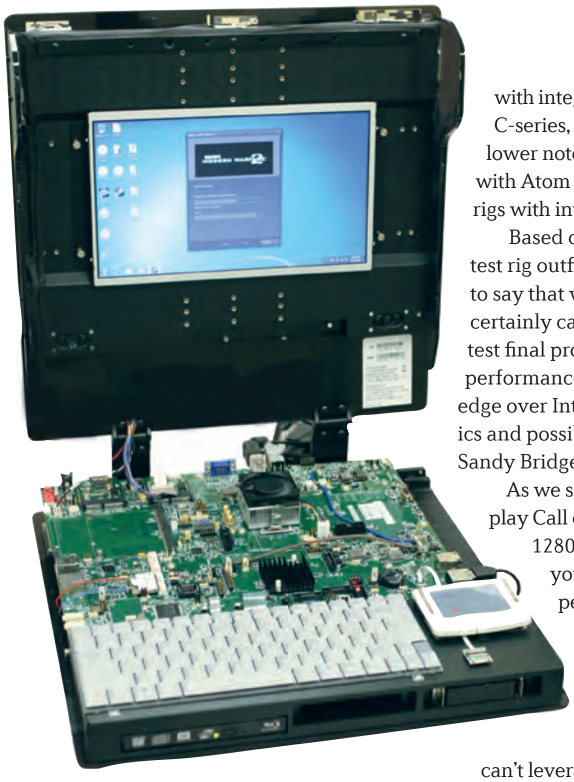
The 40nm-based Zacate Fusion chip packs dual x86 cores along with an 80-"nanocore" GPU, an integrated memory controller, and eight PCI Express lanes.

Anyone who has ever used an Atom—even the current-generation chips—can attest to their sluggish performance. And that's at x86. Toggle over to anything graphics-related on an Atom and the space/time continuum will literally start running backward, it's so slow. To be fair, Intel's graphics have always acted more like anti-accelerators. That's not so with Fusion. We're prohibited from disclosing raw numbers right now, but we can say that Fusion is no Atom, or even Arrandale, in graphics performance. You can actually play some fairly modern games—if you're open to dropping the resolution a bit.

For example, we were able to play the hit game Call of Duty: Modern Warfare 2 at 1280x768 resolution with Fusion. Try doing that on a sub-$500 notebook with integrated graphics.

AMD's messaging on power consumption is also promising. With the Zacate version of the chip, the company thinks worst-case power consumption will be 18 watts. On the test platform





We tested Zacate on a notebook test rig built by AMD for engineering purposes.

we used, power draw for the complete computer at the socket was roughly 10 watts, and under gaming loads it was 30 watts. The Ontario version will consume 9 watts. A typical Zacate-based notebook should run in excess of seven hours and Ontario notebooks will push 10 hours.

AMD said it was able to achieve that through clock- and power-gating as well as a C6 state to further reduce idle power. The first rev of Fusion is not just a server or desktop chip chopped down to save power. AMD says it was designed from the get-go to sip power.

SO WHERE WILL FUSION COMPETE?

AMD said Zacate, or E-series, chips will likely be used in $450 to $500 notebooks. The main competition will be Pentium-based notebooks with integrated graphics. Ontario, or C-series, chips will likely go into $300 or lower notebooks that compete squarely with Atom notebooks, as well as Celeron rigs with integrated graphics.

Based on a day of benchmarking a test rig outfitted with an E-350, we have to say that we're suitably impressed. We certainly can't render a verdict until we test final product, but Zacate's graphics performance could very well give it an edge over Intel's current integrated graphics and possibly even against the upcoming Sandy Bridge chips.

As we said previously, we were able to play Call of Duty: Modern Warfare 2 at 1280x768 resolution (the likely res you'd play on a small wide-aspect-ratio notebook). What's the weakness? Those x86 cores. Remember, you're still talking about a slightly slower-than-Athlon 64 dual-core to push all of your applications that can't leverage the GPU. While we know an Athlon 64 certainly slays an Atom, things would likely get ugly against a Penryn-based Celeron or Pentium, or even a Westmere-based Core i3.

But life is a compromise. And AMD believes that most people carrying $500 notebooks are more concerned with consuming video and games—not creating them. In other words, how many people do video encoding or editing on $300 netbooks, or sit down to crunch a massive spreadsheet with a cheap notebook? Probably not many.

Overall, we're pretty excited by Fusion. To be able to get discrete-level performance in a sub-$500 notebook (and sub-$300 netbook) is practically revolutionary. Fusion isn't just about netbooks, either. We're looking forward to a HTPC that sips 10 watts but can accelerate higher-definition content. And once we see Fusion APUs combining AMD's next-generation Bulldozer core in 2012, we will truly be in a brave new world.

SPECIFICATIONS

Family / Code-Name	Brazos / Zacate	Brazos / Zacate	Brazos / Ontario	Brazos / Ontario
Model	AMD E-350 with AMD Radeon HD 6310 graphics	AMD E-240 with AMD Radeon HD 6310 graphics	AMD C-50 with AMD Radeon HD 6250 graphics	AMD C-30 with AMD Radeon HD 6250 graphics
CPU Clock	1.6GHz	1.5GHz	1GHz	1.2GHz
CPU Cores	2	1	2	1
GPU Clock	500MHz	500MHz	280MHz	280MHz
GPU Cores	80	80	80	80
Max TDP	18W	18W	9W	9W
RAM Support	Single-channel DDR3/1066	Single-channel DDR3/1066	Single-channel DDR3/1066	Single-channel DDR3/1066
L1 / L2 Cache	128KB / 1MB	128KB / 1MB	128KB / 1MB	128KB / 1MB

FAST FORWARD

Intel's Twist on Reconfigurable Logic

Fully aware that its cash cows (PC processors) are losing their status as prize cattle, Intel is flinging lassos in all directions to catch new business. One project, code-named Stellarton, was mentioned almost as an afterthought at a recent Intel Developer Forum. It attracted little attention but is another step toward reconfigurable computing.

Stellarton chips, scheduled for release in 2011, will pair an Atom CPU with a field-programmable gate-array (FPGA) in the same chip package. Physically, they're similar to Intel's Clarkdale and Arrandale PC processors, which pair a CPU with a GPU in the same package. The crucial difference is that Stellarton substitutes an FPGA for the GPU.

FPGAs, also known as programmable-logic devices (PLDs), have reconfigurable logic gates instead of the fixed-function gates found in microprocessors. They are programmable at the hardware level, not just in software. Developers can configure an FPGA to perform virtually any function. Indeed, an FPGA can be configured as a general-purpose CPU and then programmed in software, just like any other CPU. But conventional CPUs are better for that, so FPGAs are usually configured for special-purpose processing. They can perform those tasks much faster than conventional CPUs.

Although Intel remains mum about Stellarton, it's obviously designed for systems that need high-speed specialized processing—and reconfigurability. See, another advantage of FPGAs is that developers can reconfigure them even after building and deploying a system. In fact, some systems allow remote reconfiguration over the Internet.

Imagine if you could download something like a firmware upgrade that added Intel's latest graphics extensions to your existing processor, without having to buy a new chip. Conventional CPUs are like sculptures in marble; FPGAs are like wet clay.

One possible application for Stellarton is cellular base stations. It's much easier to reprogram an FPGA remotely than to send a technician climbing to the top of an antenna pole to install a new chip. There are possible PC applications for reconfigurable logic, too, but prices must drop first. Still, reconfigurable processing is a technology worth watching. It wasn't so long ago when microprocessors were also "too expensive" for mere mortals.

Tom Halfhill was formerly a senior editor for Byte *magazine and is now an analyst for* Microprocessor Report.

Fermi Made Whole: Nvidia's GTX 580

A better process technology helps Fermi realize its full potential

The GTX 580 reference card features a vapor chamber for cooling, in place of the GTX 480's heat pipes.

When Nvidia launched the original GTX 480, it shipped an incomplete chip. One entire functional block, known as a streaming multiprocessor, was disabled. Whether that was because of chip yield or power issues was never disclosed. Ten months later, Nvidia is launching the GTX 580, using the same architecture as the original part. The new chip is a complete re-spin of the GTX 480 GPU, re-engineered at the transistor level.

The GTX 580 does offer a few tweaks to the original, such as improved FP16 texture performance, which should lessen the performance impact of high-definition rendering. The biggest changes, however, are at the process-technology level, enabling Nvidia to ship a complete Fermi chip with all the functional units enabled. In addition, the clock rates have been juiced a bit, with the core clock running at 772MHz, or about 10 percent higher than the GTX 480's 700MHz. The memory clock is running at 1,000MHz (versus the original 924MHz.)

In addition to the GPU improvements, the GTX 580 card has been redesigned. A vapor chamber replaces the GTX 480 heat pipes, improving heat dissipation and efficiency. The paddlewheel fan now has a rigid ring built around it, minimizing fan-blade vibration. The plastic shroud that channels air is beveled and the fan recessed a bit more, which improves air-flow in dual- and triple-SLI configurations.

Initial testing of the reference card shows that the GTX 580 will likely run about 10–20 percent faster in most games than the stock GTX 480. While performance per watt is better, the overall power draw is about the same, and Nvidia recommends a minimum 600W power supply for systems running a single card. Noise levels seem much reduced over the GTX 480, particularly under heavy load.

Nvidia's suggested retail price is $500, but initial shipments of cards have been running around $550. While the GTX 580 is, for the moment, the fastest single-GPU card available, that's still a pretty steep price. Nvidia will be phasing out the GTX 480, but the GTX 470 will continue to ship at reduced prices, with those cards costing less than $300. **—LC**

BENCHMARKS

	GTX 580 Reference Card	XFX Radeon HD 5870 XXX Edition	Asus GTX 480
3DMark Vantage Extreme	**13,030**	9,473	9,199
Unigine Heaven 2.1 (fps)	**35**	17	30
Crysis (fps)	**39**	33	31
BattleForge DX11 (fps)	**73**	49	63
Far Cry 2 / Action (fps)	**76**	65	**76**
Far Cry 2 / Long (fps)	**120**	78	103
HAWX DX10 (fps)	**149**	92	121
STALKER: CoP DX11 (fps)	**56**	38	44
Just Cause 2 (fps)	**50**	37	47
Aliens vs. Predator (fps)	**43**	31	36
Dirt 2 (fps)	**112**	73	91
HAWX2 DX11 (fps)	**167**	64	145
Power @ idle (W)	146	**142**	153
Power @ full throttle (W)	385	**290**	357

Best scores are bolded. Our test bed is a 3.33GHz Core i7-975 Extreme Edition in an Asus P6X58D Premium motherboard with 6GB of DDR3/1333 and an 850TX Corsair PSU. The OS is 64-bit Windows Ultimate. All games are run at 1920x1200 with 4x AA.

GAME THEORY

The Strange Allure of Minecraft

Since I have a junior-high student living somewhere in my house (I'm not sure exactly where, but he might be nesting under the eaves), I get to hear what the teen-set finds "peachy keen" or "groovy," in the words of kids today. Almost all conversations revolve around gaming, and no one is talking about Kinect, Halo: Reach, or Black Ops... at all.

No, they're all talking—incessantly—about Minecraft. They trade recipes and tips, and talk about their workbenches and adding new wings to their houses. They pour over the Minepedia like it's the Dead Sea Scrolls and commiserate on the challenges of obsidian farming.

Although I'd played it last summer, I was surprised to find kids discovering this game on their own. Minecraft falls somewhere between a 3D Dwarf Fortress (albeit a version of Dwarf Fortress playable by actual humans) and the crafting element of certain MMOs, but done with vintage early-1990s PC graphics. That's not a knock, by the way. Since the entire game is based around cubes and their manipulation, the blocky visuals actually suit the game quite well, giving it a consistent cubist aesthetic that's oddly pleasing.

The game's work-in-progress nature, it turns out, is part of the appeal. Gamers not only love playing it, but love being part of its development, waiting for new update as developer Notch Persson rolls them out. Two weeks before the Halloween update, all I heard was talk about Ghasts and portals in the kind of excited tones little girls usually reserve for discussions about Justin Bieber's hair.

This is *exactly* what PC gaming needs, because it is what PC gaming alone can do. (Oh, OK: Mac too. *Bleh.*) I've been banging on for years about how the receding waters of mainstream PC gaming are going to draw a wellspring of creativity to the surface, as independents use Java and other tools to make unique games to fill in the gaps. Minecraft's grassroots success is further evidence that the wild frontier days of early PC gaming are upon us once again.

Thomas L. McDonald is an editor at large for *Games* magazine and blogs at sopgaming.blogspot.com. You can follow him on Twitter at StateOfPlayBlog.

Apple SSD for Everyone

One of the more noteworthy technologies in Apple's latest MacBook Air notebooks is an ultrathin form factor SSD. With flash memory laid out along a narrow card similar to a RAM module, the SSD can fit into smaller spaces and accommodate more-ultraportable notebook designs. Toshiba is now making those modules, known as the Blade X-gale series, available to all device makers. The "drives" will come in capacities of 64GB, 128GB, and 256GB. **-KS**

Nvidia Ditches Chipsets

Business weakened by standoff with Intel

Nvidia's 790i SLI was the last desktop chipset produced for the PC running Intel silicon.

Nvidia CEO Jen-Hsun Huang announced that the company is leaving the chipset business, ending industry-wide speculation over that very question. "We are not building any more chipsets, we are building SoCs now. We are building Tegra SoCs, and so we are going to take integration to a new level...," Huang said.

Although Nvidia will cease building new chipsets, the GPU maker intends to continue shipping its current products well into 2011. Those products include the company's chipset for AMD, as well as the MCP89 chipset—the last chipset Nvidia developed for Intel and which continues to be used by Apple.

Huang's announcement isn't all that surprising, considering that Intel essentially put the kibosh on a large part of Nvidia's chipset business. Prior to Nehalem, Nvidia was producing chipsets for Intel processors as part of a licensing agreement between the two firms, but Intel's stance is that the license only covers CPUs that don't contain an integrated memory controller. **-PL**

FCC PROBES GOOGLE

Street View data-collection saga continues

Google may have been excused by the Federal Trade Commission for inadvertently collecting personal information from unprotected Wi-Fi networks, but the Federal Communications Commission wants to render its own verdict on the matter.

At issue is Google's admission in May 2010 that its Street View cars had mistakenly gathered data, including email addresses, passwords, and URLs, in the process of photographically mapping the world's streets.

The company acted suitably contrite, enacting changes to its privacy policies and promising better privacy training for its staff. And these measures seemed to satisfy the Federal Trade Commission, which closed its investigation of the matter in October.

But Google is not off the hook just yet. The FCC has announced that it's launching its own probe to determine whether the unauthorized data collection violated the Communications Act. **-KS**

BYTE RIGHTS

QUINN NORTON

Copyright and the Melody Machine

I like to complain that the copyright laws we have don't deal realistically with how we consume or share media in the digital world. Just to round out my complaints, I'm going to whine that they don't deal with how we are creating digitally, either. As clever as the creators of copyright were in many ways, they have to be forgiven for never imagining a world where we can use scripts, algorithms, or Markov chains to generate endless variations on a theme.

In America, what you create with machines is your copyright. In 2006, Harvard Law student Rob Rogoyski decided to show just how weird this could get; he decided to compose all melodies. Rogoyski wasn't particularly musical. Being a copyright geek, Rogoyski wasn't after music. He wanted to find out what happens when a 300-year-old way of looking at the ownership of music encounters a guy with a lot of hard drive space and a brother who can write Java.

The number of original songs that could ever be composed by musicians is effectively infinite. But the number of possible melodies songs can be made of, given a fixed length of notes, is not. It's in the low trillions. Large, but doable, computationally speaking.

Rogoyski didn't have the resources to get into the trillions, but he could get into the billions by generating and storing melodies as number sequences. Then, he gave everything in the Melody Machine away. The theory went that if you heard something in a song you wanted to sample, instead of mucking with clearing rights you could head over to the Melody Machine, find the sequence you wanted, and use it to create your derivative work. Or you could just listen to it for free.

Everyone he talked to in the legal world about his machine told him he'd never get away with it. But everyone in the computational world knows without asking he already did. In 2011, computation is part of the natural world, and laws that fight with the natural world always lose in the end.

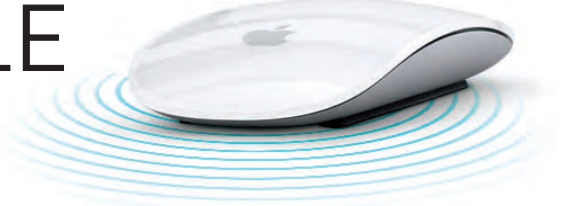
Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST
Apple's 8 Greatest Failures

8 POWER MAC G4 CUBE

One of Apple's earlier small form factor attempts, the overpriced and underpowered Cube suffered from "cracks" in the acrylic case and hit the dustbin after one year of sales.

7 APPLE MICE



6 THE NEWTON

Poor handwriting recognition killed this early tablet-size PDA.

5 APPLE III

Until the failure of LISA, the Apple III was Apple's biggest bomb, selling only 65,000.

4 PIPP!N

Few remember that Apple tried to get into the gaming-console market, but Nintendo and PlayStation were already there.

3 APPLE TV v1

2 LISA

Apple's own Shakespearean drama saw the LISA murdered at the hands of Macintosh and Steve Jobs.

1 ARCHITECTURE CHOICES

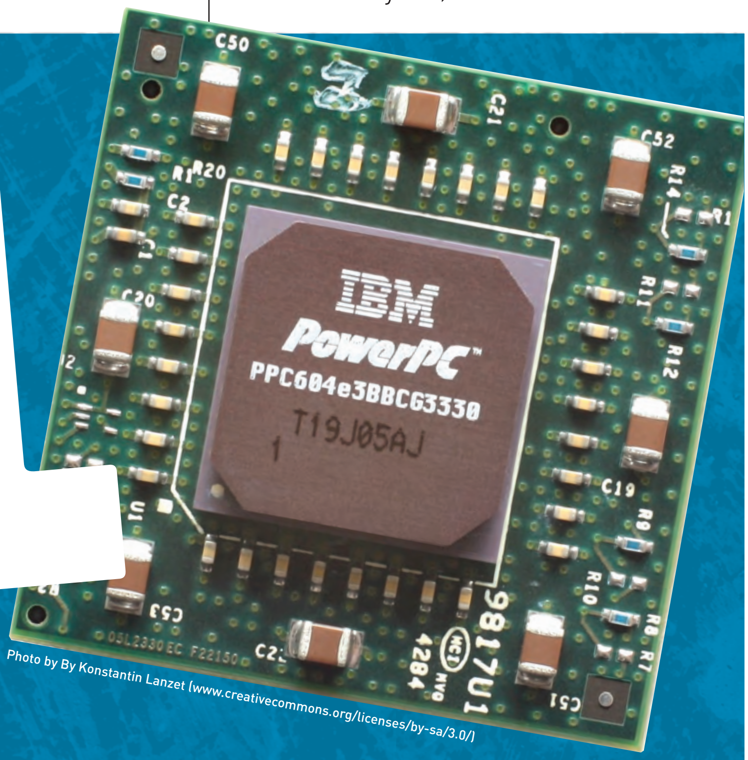


Photo by By Konstantin Lanzet (www.creativecommons.org/licenses/by-sa/3.0/)

Apple sure can pick 'em: Motorola 68000.... No, wait! PowerPC.... No, wait! x86....

DEATHMATCH

USB 3.0 vs. eSATA

There are only so many ways to connect external storage devices to your computer. The three main contenders are USB, FireWire, and eSATA. Even though USB 2.0 was crippled by 33MB/s transfer speeds, it's easily the most popular interface. That trend seems bound to continue as USB 3.0 adoption ramps up, offering much improved bandwidth. FireWire, for its part, is practically dead (even Apple computers don't ship with FireWire ports anymore). Most enthusiast motherboards feature eSATA, but when's the last time you saw an eSATA hard drive enclosure? Given USB 3.0's theoretical throughput of 5Gb/s, is it time to throw out eSATA for good, or is there still some life left in the spec? We pit USB 3.0 against the aging 3Gb/s eSATA spec to find out. **–NATHAN EDWARDS**

ROUND 1

FEATURES Sure, both USB 3.0 and eSATA can be used to connect external storage devices to your PC. But the beauty of USB is that it's universal: A USB 3.0 port can also accommodate a printer, input device, fan, MP3 player, smartphone, camcorder, novelty mug-warmer, or light-up globe—and it's backward-compatible with USB 2.0 and USB 1.1. With eSATA, you're limited to hard drives and (some) flash drives. However, eSATA passes along native SATA commands—from a device standpoint, there shouldn't be any difference between an eSATA drive and a native SATA drive. USB 3.0 hard drives have to use a SATA-to-USB controller. But that still can't negate USB's multifunctionality. **WINNER: USB 3.0**

ROUND 2

AVAILABILITY Most non-budget motherboards released in the last few years have at least one eSATA port, and plenty of computer chassis have front-panel eSATA connectors that plug right into one of your mobo's SATA ports. It's only in the past four or five months that USB 3.0 has appeared on laptops and computer chassis, and for desktops there's no internal motherboard header yet. That means that the USB pass-through cables have to go right out the back of the case and plug into the USB 3.0 headers on the back of your motherboard.

On the other hand, USB 3.0 drives and enclosures are already quite common, while eSATA drives are not. **WINNER: TIE**

eSATA cable

ROUND 3

EASE OF USE It doesn't get much easier to use than USB: just plug in and go. Every operating system has incredibly robust USB drivers, and will automatically recognize and mount storage volumes on USB. USB 3.0 devices can also function just fine plugged into USB 2.0 ports—though, of course, they won't be as fast. eSATA is flakier. Though you can hotplug eSATA devices, there's no guarantee that they'll show up until after a restart. And performance can be very chipset-dependant. **WINNER: USB 3.0**

ROUND 4

PERFORMANCE The theoretical throughput of USB 3.0 is 5Gb/s, which is nearly twice the current eSATA spec of 3Gb/s, so we expected USB 3.0 to trounce eSATA in the benchmarks. But we were wrong. Really wrong. We tested both interfaces with the same SSD and test rig, using eSATA and USB 3.0 docking stations from the same product line, and 3Gb/s eSATA trounced USB 3.0. Not by a little bit, either: eSATA read speeds were half again of the USB 3.0 equivalent, and write speeds doubled on eSATA versus USB 3.0. As the USB 3.0 spec matures, expect that gap to narrow, but by then 6Gb/s eSATA will be out. **WINNER: ESATA**

USB 3.0 cable

BENCHMARKS

	Patriot Inferno with USB 3.0	Patriot Inferno with eSATA
HDTach 3.0.1.0		
Avg Sequential Read (MB/s)	126.8	**184.1**
Avg Sequential Write (MB/s)	111.0	**207.8**
Burst Speed (MB/s)	131.5	**231.3**
Random Access (ms)	.2	.2
CPU Utilization (%)	4%	4%

Best scores bolded. Our benchmark uses the onboard eSATA and USB 3.0 ports on a Gigabyte GA-H55N-USB3 motherboard with an Intel Core i5-655K CPU and 4GB of DDR3/1800. USB 3.0 test used Thermaltake BlackX 5G HDD Docking Station; eSATA test used Thermaltake BlackX Duet HDD Docking Station. Drive used was 100GB Patriot Inferno SSD; benchmarks taken with HDTune 4.01.

And the Winner Is...

We gotta give it to USB 3.0. Even though eSATA has the clear edge in performance—and the added benefit of faithfully passing through native SATA commands—nearly all mass storage devices still use mechanical hard drives, and both USB 3.0 and eSATA are more than capable of throughput that exceeds the fastest mechanical drives on the market. USB 3.0 has the edge in versatility and ease of use, too—you can plug thousands of different devices into a USB 3.0 port. While eSATA offers great performance and SATA fidelity, it just can't do as much. And its driver set is not as robust.

Furthermore, eSATA ports aren't becoming any more prevalent: In this month's case roundup, 60 percent of the cases had front-panel eSATA ports and 80 percent had USB 3.0—even without an internal motherboard header spec for USB 3.0. With a finalized internal header spec just around the corner and native USB 3.0 integration in the next generation of motherboard chipsets, we think the winner is clear.

This month the Doctor tackles...

Home Network Management

Cooked RAM

Drive Transplants

RAM Cooking

Roughly three years ago, I built myself a gaming rig that could play all my games. I then decided to use liquid-cooling so as to have a better chance of overclocking. I had to cool the north bridge along with the CPU to keep it stable. I understand this has to do with the lack of air movement since the CPU fan is missing. Over these last three years, I've burned through four full sets of memory! It got so bad that I refused to turn off my rig for fear of a failure to reboot. Could it have anything to do with the missing fan? If so, how do you fix this?

—Kurt Colbourne

Four sets, Kurt? Your machine is a deathtrap! There are a couple of possibilities here. If you're overclocking your RAM as well as your processor, you might be using voltages and timings that the RAM you're running can't support. Make sure you buy RAM that's rated for the clock speeds and timings you're overclocking to. Even if the RAM is "rated" to run at higher voltages than those approved by JEDEC (the consortium that oversees RAM), there's no guarantee that it'll run at the overclocked speed for long periods of time. That's why buying RAM from a vendor that offers a lifetime warranty on overclocked RAM is a great idea. Despite this, four sets of RAM sounds pretty excessive.

It's quite likely that you have insufficient airflow over the RAM.

Even though you're water-cooling your CPU, you still need sufficient airflow into (and out of) your case to cool the rest of your components. Make sure you have at least one front intake fan, and an exhaust fan or two at the rear or top of your case. Remember, the hottest component in a gaming PC today is the GPU, and its heat can bake the RAM. You might want to consider a side intake fan blowing directly onto the north end of your motherboard. You could even use a dedicated RAM cooler—if you're rocking Corsair Dominator RAM, the Corsair AirFlow Pro is a good choice; otherwise, there are some third-party RAM coolers out there.

A RAM fan like this Kingston HyperX RAM cooler can help prevent heat death.

Home Network Management

I find myself with 16 operational systems in my home. Each family member has their own system, and we have an HTPC, home server, LAN party game server, and a few guest computers for LAN parties. Most users have a hard enough time ensuring they keep one PC updated with fresh AV definitions and security patches, but multiply that by 16 and it becomes a very time-consuming task.

I currently use a scratch-built Windows Home Server. The system provides daily backup, file management, media storage (video, photos, and music), and data recovery for the networked computers, which run operating systems ranging from 64-bit Win7 to 32-bit Windows XP Pro.

In the past, I have used products such as Network Magic for basic home network management. It did a satisfactory job of mapping my existing network, and even showed available Windows updates for each machine, but was not able to remotely push these updates. I now feel that tool is no longer robust enough for my needs. I am looking for a solution that will allow centralized management of my home network, including pushing antivirus definition and Windows updates to all my PCs. These tools exist for business and corporate environments, but I can't justify the cost to implement them on my home network.

Can you suggest a reasonably priced tool to help me better manage my home network, and reduce the time I spend keeping my systems up to date?

—David Kuhn

Wow! Sixteen systems is a lot to manage. Unfortunately, the Doctor and his minions don't know of any centralized tools for Windows Home Server that allow you to push Microsoft updates to attached clients. We have, however, heard good things about a free, ad-supported network-management tool called Spiceworks (www.spiceworks.com). Spiceworks will map your networked devices, like Network Magic does, but it can also inventory your equipment, track warranties and service contracts for your gear, and a lot more. It's designed for small to medium-size businesses and probably has more fea-

tures than you'll need—including a help-desk function that issues and manages trouble tickets—but it won't cost you anything to check it out. Another option is Intel's IT Director (www.intel.com). It will monitor your machines' security states and the status of their AV and firewall. It's free, but will only work with Intel-based machines equipped with vPro.

Platter Transplants?

I recently had a hard drive failure and lost the data from my external drive (a WD Passport). I don't have the time or money to send it off to a data recovery service. If I get a drive with the same characteristics as the one that failed, and proceed to transfer the platters to the new hard drive in the cleanest possible environment, can I recover my data? Do I have to keep the platters lined up in the same position they were in in the old drive? Is there any way I could screw up the platters' sync? I tried a new controller board for the hard drive with no result.

To avoid storing data on disks with moving parts, I'm thinking of grabbing a large thumb drive, like a Corsair Voyager. What's the lifespan of such a thumb drive compared to a spinning-platter HDD? SSDs are out of the picture right now, as I need to use the drive over multiple operating systems. Windows XP, which is used at my university, has no Trim support. Any advice would be appreciated.

—Cosmin Adam

Cosmin, unless you have access to an industrial clean room, we have to recommend against opening up your hard drive. Even the tiniest bit of dust can seriously damage your platters. We don't know of *any* nonprofessional who's ever opened up a hard drive and got it working again. If replacing the controller board with one from a drive of the exact same make and model didn't work, and you've already tried just plugging the drive into a spare SATA port or a different external adapter, you might be out of luck, without resorting to a data recovery service. That's assuming the drive doesn't show up at all if you plug the bare drive into a SATA port on your computer. If it does show up but without any of the data, you could be in luck—it's possible the file table has just been corrupted. You can use a program like TestDisk (www.cgsecurity.org) to try to restore the drive's file table and recover your files. Whatever you do, don't format or overwrite your drive until you've tried TestDisk

As to the second part of your question, flash storage is especially useful in portable drives, since it's more tolerant of drops and jolts, and there are no moving parts to get ruined. Flash drive reliability can vary; we have a 256MB PNY Attaché that's been through the wash five or six times over the past seven years or so and still works fine, but a 4GB drive from a different manufacturer failed within a few months. In general, go with a reputable brand and make sure you keep backups of your data. Of course, if you need to move large amounts of data, mechanical storage is your best bet—unless you want to drop $500 on a 256GB flash drive.

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

ILLUSTRATION BY ADAM BENTON

Protect AND Defend

For every freedom and convenience we enjoy in our digital lives, there are countless cyber do-badders looking for ways to exploit them. Fight back with these 32 ways to protect your digital life!

BY THE MAXIMUMPC STAFF

Mark. Sucker. Victim. Yeah, that's you viewed through the monitor of a cybercrook sitting somewhere in A-holevania or Trashcanistan.

Call us cynical or hard-edged, but we frankly believe that the world is filled with hustlers, grifters, and crooks out to bamboozle us at every turn.

Those suspicions are doubled for our digital lives. For no longer do bunko artists need to trick you into buying that iPad box with a brick in it. Today, they can rip you off by auto pilot. With the deadliness and stealth of a UAV, these scumbags can steal your banking credentials, clone your debit card, or infect your computer.

Scared yet? Good. Fear is one of best motivators to getting people off of their lazy butts. It's not all about fear, though. It's also about information. Knowledge that can empower you and help you mount an effective defense against the multipronged attacks we all face today. Do you know how to thoroughly fortify your PC and network against enemy infiltration? How about your smartphone? Can you spot an ATM skimmer? What other potential threats should you be aware of? We'll give you all of the deets, along with the opinions of two security experts.

Don't worry about being too paranoid. From what we learned in the course of writing this story, there's really no such thing as being overly vigilant when it comes to your digital security.

Protect Your Desktop PC

Installing strong, up-to-date security software is a given. But it takes much more than that to defend the epicenter of your digital life

Keep Your OS Patched

Could real people actually be as clueless as some of those characters we see in movies? Sadly, you need no more evidence of that cliché than the average computer user. Even though he or she knows that an OS update is as critical as, say, nailing boards over your windows in a zombie apocalypse, many choose to ignore the updates until something crawls in and eats their brains.

The most basic security step PC users should take—regardless of OS—is to install the latest updates. Yes, we know, it can be teeth-gritting—especially when the updates are larger than the original OS—but it's necessary for patching holes being used by attackers to squeeze into your PC.

Lose Windows XP

Windows XP was a great operating system but it's now pushing 10 years old and it's a popular target for attacks. Why? It's not as secure as its replacements. It's also where the money is—literally—with 51 percent of computers on the *planet* running it. Many attacks specifically target XP and ignore Windows Vista and Windows 7 completely. Unless you like to wrench on your OS all day, we recommend that you give XP the retirement it has earned.

Keep Your Applications Patched

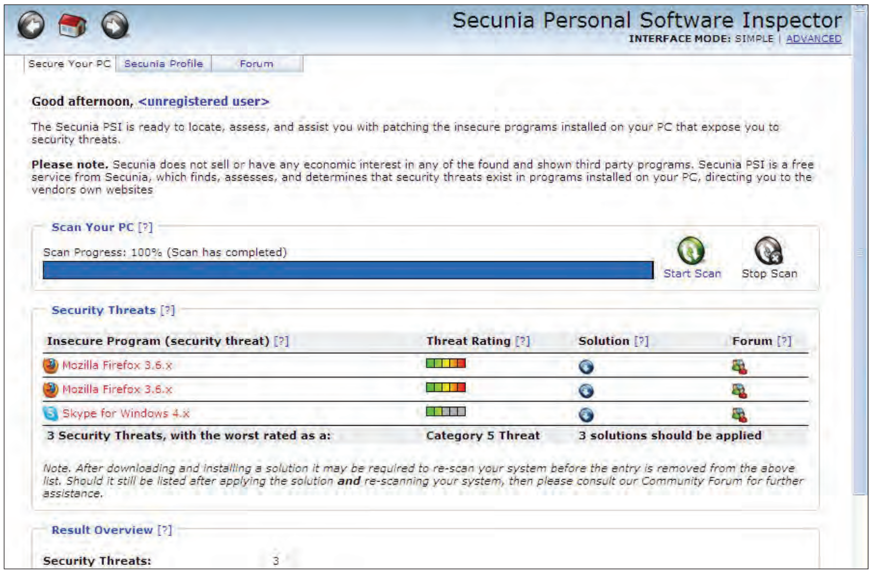
Even Microsoft haters have to admit the company has done an admirable job patching its operating systems in a reasonable amount of time. Because of this, many of the weak spots on a PC aren't even the OS anymore, but rather the third-party applications. While Microsoft will patch its own products in Windows Update, it doesn't do squat about anything else. With literally dozens of apps to check for updates every week, you can see where the problem lies. That's why we run Secunia's PSI Scanner (www.secunia.com). The free app runs in the background and checks your installed apps and plugins for available updates and then gives you a link of where to download the patch. The latest beta version will actually install some of the updates for you. The company also offers an online scanner but we don't recommend it because it runs in Java.

Beware the Usual Suspects

When a massive malware outbreak occurs, you can almost always expect to see these five shifty guys in the police lineup: Flash, Acrobat/Reader, QuickTime, Java, and JavaScript.

Normally we'd say just execute 'em, but it doesn't always work that way. Yes, if you can, simply uninstall these offenders (save JavaScript), but if you must have them, there is a way to at least mitigate some of the damage.

Start by disabling Acrobat/Reader in your browser. In Firefox, go to Tools, then Add-ons, then Plugins, and disable the Acrobat plugin. While you're there, you should also probably disable QuickTime, Java, and even the DivX Web Player if you want to be extra cautious.



Secunia's free PSI app will monitor the dozens of applications installed on your machine for available security patches.

To disable these plugins in Chrome, go to Options, Under the Hood, Content Settings, Plugins, and select "Disable individual plugins."

Now, go into the Acrobat app, go to Edit, Preferences, Trust Manager, and uncheck "Allow opening of non-PDF file attachments with external applications." While you're in Preferences, click the JavaScript option and uncheck "Enable Acrobat JavaScript." Also click on Internet and uncheck "Display PDF in browser." Or just dump the whole thing for Foxit Reader (www.foxitsoftware.com).

For QuickTime, start the player, dig into Edit, Preferences, QuickTime Preferences, Browser, and uncheck "Play movies automatically."

To mitigate the damages from Adobe Flash, consider running the FlashBlock extension in Firefox and Chrome. This will prevent Flash from being displayed on a page. In its place will be a place holder that, when clicked, will play the Flash content.

Disabling JavaScript unilaterally can be problematic, as it breaks many sites. Still, for the paranoid, there is a way. The NoScript extension for Firefox is the leading contender. Chrome has no such extension, but you can go to Tools, then Options, then Content Settings, then JavaScript, and select "Do not allow any site to run JavaScript." This will place a small icon in the address bar that will let only your favorite sites run JavaScript. Disabling JavaScript in Chrome can be wonky, but it's worth investigating if you want to avoid one of the primary ways crooks are targeting you.

Use a Virtualized Browser

Since the vast majority of attacks are coming from the browser, one of the safest ways to surf the web is from a virtualized browser or a virtual machine. Dell offers its free KACE browser (www.kace.com), which virtualizes Firefox 3.6 along with Adobe Reader and Flash. Malware that exploits holes in Firefox, Reader, or Flash would be contained within the virtual machine. The bad news? If you do get an infection and need to flush the virtual Firefox, you lose all of your settings. That includes the numerous updates to Firefox that come out seemingly every month and any bookmarks and plugins you installed. An alternative is to build a virtual machine using either Virtual PC 2007 (www.microsoft.com) or VM Ware Player (www.vmware.com). Both are free, and both Microsoft and VM Ware offer free images that include browsers. Microsoft offers Vista and XP with IE8 installed and VM Ware offers Ubuntu with Firefox installed. Of the three options, VM Ware's is the most solid but folks not used to Linux might be thrown for a loop. Microsoft's images time out after three months, so you'll have to download it again.

Disabling plugins for Acrobat, QuickTime, and other media players can mitigate some of the damage from new zero-day exploits.

Get a Second Opinion

Do you really know if that file is truly untainted? Many malware writers are specifically crafting wares to avoid detection by antivirus suites. If you have a file that you need to run, we recommend that you incubate it for a few days or a few weeks if possible. This gives security software a chance to catch up to any new exploit. We then recommend that you get a second opinion from Virustotal.com. This website lets you upload a file to be scanned by two dozen AV engines. Just remember that malware writers are also using tools such as Virustotal.com to see if their wares can pass muster, so long incubations are key.

PHYSICAL SECURITY

Put Your Laptop on Lockdown

Obviously, all the same security risks and safety recommendations that apply to your desktop computer also apply to your laptop. But your laptop carries the added risk of being stolen. And let's face it: If you haven't encrypted all your sensitive data or been diligent about backups, the loss of your laptop could be mighty painful. One way to prevent the potentially dire consequences is to use a laptop lock.

The vast majority of notebooks have a slot to accommodate a physical locking mechanism—it's usually designated by a padlock icon. The lock itself is attached to a reinforced cable which cannot be easily cut without the aid of a large and very noticeable set of bolt cutters. The cable is either bolted to the floor—in your office at work, for instance—or looped around a substantial or immovable object. Kensington is one of the biggest names in cable-lock makers, and offers both combination and key locks, priced at $25 and $50, respectively.

Kensington's new ClickSafe key lock makes it an easy one-step process to secure your laptop from snatch-and-grabs.

Although many URL shortening services claim to scan for malware, it's probably best to lengthen those URLs before you click on them, using Longurlplease.com.

Unshorten Those URLs

Shortened URLs can conveniently turn unwieldy web address into bite-size morsels, but they can also disguise a link to a malware-ridden site. Though many of the URL shortening services check for malicious websites, it's usually better to verify a shortened URL's destination. For that, we use Longurlplease.com. It supports 81 shortening services. As for cryptic shortened URLs, visit Virustotal.com to have the address checked by six URL analysis engines.

Run in a Standard User Account

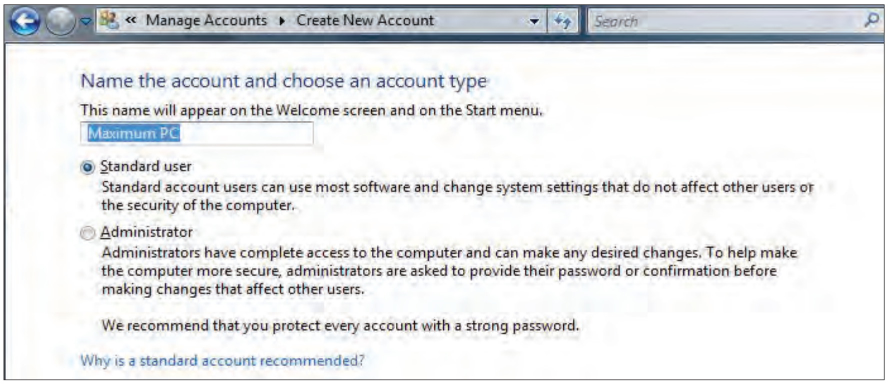
Running as an administrator in a Windows OS is a bit like giving someone the right to walk into your home and rummage through every nook and cranny. One easy way to avoid or greatly limit damage from malware is to always run with standard user rights. As with all things, this is no guarantee against harm. Some malware, even when executed in a standard user account, can grant itself administrator privileges and still run rampant through your PC, but running as a standard user minimizes risk.

Use a Live CD/Linux Distro to Do Banking

That Windows is the number one target for cybercrime and mischief is not news to any of us—naturally, owning 95 percent of the market makes it an obvious target. That's why we agree with security journalist Brian Krebs (http://krebsonsecurity.com) that members of the most at-risk group should do online banking with a Linux Live CD. You can do your gaming and other Windows-based computing booted from your hard drive. But once you have to go into secure mode, whip out your Live CD and boot to it. Numerous Linux builds are available, but the most popular, and among the easiest, is Ubuntu.

Restrict PC Access for Others

So, you've created this incredibly secure moat, ringed with razor wire, claymores, and mines. And then you let your 14-year-old nephew play some Flash games or "check email." Right. The best solution is to have visitors use a separate, secured guest PC. But if they must use your machine, make sure you have the guest account activated. Another option is to have them use a virtual machine. Once they're done, simply shut down the VM and erase any trace of their activities. Or have them use your HTPC, where they're working in the open instead of being left alone in your office.



Running in standard user mode in a Windows OS has proven to be useful in beating back malware attacks.

HOW IT WORKS

Anatomy of a Drive-by Download

You think you're immune to harm because you don't go to piracy or porn sites, right? But putting all your faith in Goody Two Shoes browsing is like whistling past a graveyard. Like commercial fishermen, crooks are casting bigger nets to catch as many fish as possible. Here's how they do it.

1 Crooks discover a new zero-day exploit using Adobe Flash, Adobe Reader, Oracle Java, Apple QuickTime, JavaScript, or the browser itself.

2 The crooks then hack into an advertising server or a web page to place the code. In some cases, the crooks masquerade as legit advertisers and buy time on mainstream websites. These ads, in turn, are actually hosted by the crooks' servers to keep the company running the ads from knowing they're tainted.

3 Users browsing the legitimate website receive the bad Flash or JavaScript, which then secretly installs a trojan on their PC.

4 The trojan then contacts another server that is controlled by the crooks and receives instructions on what to do.

Protect Your Network

Keep your digital bits out of the hands of baddies

Use Google Public DNS

If the crooks can't convince you to visit their phony-baloney banking webpage, the next step is to get you there against your will. One way to do that is to poison the DNS cache you're using. The DNS server translates URLs into IP addresses. By exploiting flaws in the DNS software, crooks are able to redirect you to any sight of their choice—even if you typed in the correct URL of your bank.

To avoid this, we recommend switching from your ISP's DNS to Google's public DNS (http://bit.ly/7Ti5tM). It's free and the company has implemented many of the recommended safeguards against cache poisoning. To change the DNS on your client PC, go to Network Connections, right-click on your connection, and double-click Internet Protocol. Then simply enter the preferred DNS of 8.8.8.8 and alternate of 8.8.4.4 and click OK.

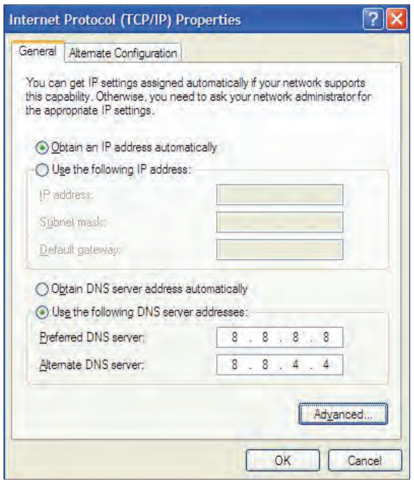
Conduct Personal Business at Home

You want a simple reason not to check your personal email at work? Someone in your network could be using a so-called "man in the middle" attack to spy on you. Whether by exploiting ARP cache poisoning, session hijacking, or some other technique, MITM attacks let a crook steal the credentials issued to your machine and then fool, say, Yahoo or Gmail into thinking he's you.

At work, with hundreds of computers and a network that stretches the coasts, you really wouldn't know where the MITM attack is coming from. This risk negates the possibility that your corporate network is more secure than your home network. So, assuming you have secured your home Wi-Fi (or don't use wireless) and that the other machines on your home LAN are secure, save your personal email and banking for home.

Secure Your Wireless

Quick, what's the most secure wireless available today? None. OK, we jest, but probably no wireless protocol is 100 percent secure. But just because there's a theoretical way to break the latest wireless encryptions doesn't mean you should be using the weakest form. The weakest, of course, is WEP. Easily broken in under a minute by anyone capable of reading an Internet how-to, WEP is far less secure than WPA or WPA2. If you're running WEP because some old hardware doesn't support WPA2, consider junking the old equipment or upgrading your router to one that supports guest networks. This lets you keep your internal network behind WPA2, while keeping guests roped off with the weaker WEP protocol to access the Internet. If you're running WPA2, the adage in security circles is that the longer and more randomized the key, the better.

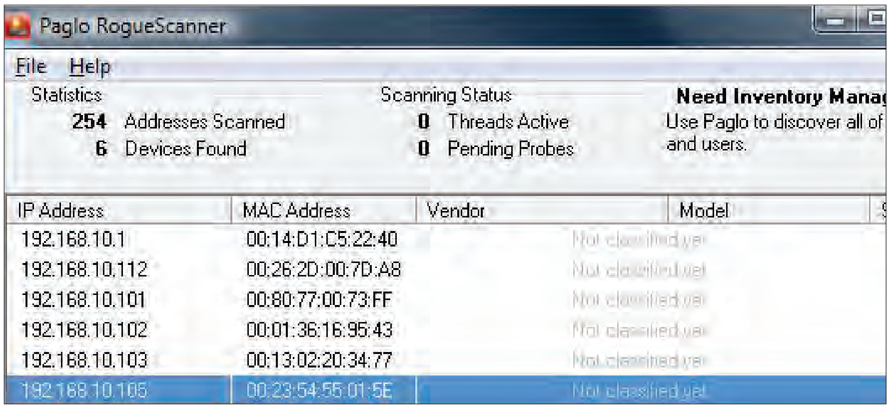


Bypass your ISP's DNS for one that's likely faster and more secure, Google DNS.

Although not a guarantee, you can also set up your router's wireless to only accept connections from known MAC addresses. These are the unique IDs assigned to each computer's network card. The hole there is that an intruder could easily spoof a MAC address from a trusted client to still access your wireless network.

Check Each Machine's Shares and Services

You can check what files are shared on a machine by right-clicking My Computer, selecting Manage, and clicking Shared Folders. Great, now how do you do it for all of the machines on your network? One way is to use NetBrute Scanner (www.rawlogic.com). This free utility will scan your internal network and report on shared resources that are available.



Running an internal port scan may help reveal intruders freeloading on your network's bandwidth.

Scan Your Network for Intruders and Piggybackers

If a neighbor has broken into your network so he or she could download movie torrents, how would you know? Since most home networks use DHCP, go into your browser's setup screen and check the DHCP screen to see how many IP addresses are assigned. Then, try to match those up with the systems on your network. If you have more IP addresses assigned than devices (remember that your smartphone will eat an IP address if it's using Wi-Fi), you may have an intruder. Another option is to use RogueScanner (www.paglo.com), a free tool that will query devices on your network and compare them to an online database of devices to help you identify the machines.

So what do you do if you have an intruder or suspect one? Since the person has likely infiltrated your network via wireless, you'll want to lock down your wireless by switching to WPA2 and using a very long and very random key.

PRESENT OFFENDERS

BY DEREK MANKY
FORTIGUARD LABS

Today's Top 5 Threat Vectors

JAVASCRIPT JavaScript is the root of many threats, since it is universally used by many applications such as web browsers and document readers. The Gumblar botnet is an active botnet that uses server-side polymorphic JavaScript code to infect machines, thus leveraging the language to start its dirty work. This means that each time you visit an infected Gumblar site, a new (previously unseen) script is sent to your browser that will begin fingerprinting—looking for software vulnerabilities. Once fingerprinted, the JavaScript will then attempt to serve up malicious exploits through other vectors such as PDF/Flash.

PDF/FLASH VULNERABILITIES There have been many zero-day vulnerabilities disclosed (and exploited) in 2010 based on PDF/Flash. These exploits have pioneered new attacks that bypass enhanced security measures such as address space layout randomization (ASLR) and data execution prevention (DEP). Due to the ubiquity of PDF/Flash technology, attackers use these vulnerabilities as a favorite way to infect machines. Oftentimes, end users think they cannot become infected through document/media files (only executables); this mentality needs to change quickly, because these vulnerabilities now present a very real and serious threat.

BOTNETS Once a machine is infected, there is another threat vector that exists—a botnet's command and control (C&C) channel. Every botnet needs to phone home in order to receive commands and send stolen data. We see this as a potent threat vector, since if this channel is blocked, no instructions can be carried out, and no stolen information can be sent. There are lots of innovative ways that botnets try to discretely access C&C channels, but the most prevalent way remains HTTP, and, as a result, we deem the HTTP protocol itself a nasty threat vector. Most botnets will simply use RFC-compliant HTTP POST/GET commands; however, some will encrypt the payload to avoid detection.

XSS HOLES Cross-site scripting (XSS) holes have always been on the radar as one of the most dangerous web-based threats and continue to enjoy success because plenty of holes still exist on the web. A great example is a worm that hit Twitter in September 2010, where malicious tweets were sent out utilizing a freshly discovered XSS hole. While Twitter took quick action to shut this down, the worm was highly effective since it only required a user to roll their mouse over a link without having to click (it used the JavaScript onMouseOver technique). By doing so, the worm would then send further malicious tweets on that user's behalf.

Persistent and nonpersistent XSS holes exist because of development oversights when implementing websites. Because they have existed for a while, and continue to be a problem, it is important to underscore the necessity of safe development practices to mitigate these threats.

THUMB DRIVES USB drives are actually one of, if not the most, common ways you can infect a network from inside a firewall. There are several reasons for this: They're cheap, small, hold a lot of data, and can be used among multiple computer types. The ubiquity of thumb drives has driven hackers to develop targeted malware, such as the notorious Conficker worm, that can automatically execute upon connecting with a live USB port. What's worse is that default operating system configurations typically allow most programs (including malicious ones) to run automatically.

Derek Manky is project manager and cyber security and threat researcher at Fortinet's Fortiguard Labs, and author of Fortinet's monthly *Threat Landscape Report*.

Smartphone Security

It's a lot smaller than your desktop PC, but the risks are just as big

Hang on Tight

Currently, the number one threat to smartphone users is having the device end up in the wrong hands, through theft or loss. Your first line of defense, therefore, is constant vigilance regarding your smartphone's whereabouts.

Use a Password and Encryption

Should your phone get lost or stolen, a good first layer of protection is a password, an option many phone users neglect. Choose the strongest password option available—a passphrase, for instance, rather than a four-digit code or swipe pattern. Encryption options vary among mobile OSes, but when possible, you should encrypt your storage card as well as your device memory.

Back Up Your Data

Just as with a PC, backing up your smartphone is important. Regularly synching the device to a linked computer will do the trick. It's insurance against the loss of your phone, corruption of your OS, or any other event that jeopardizes your data.

Don't Store Sensitive Data

The surest way to guard your sensitive data is to keep it off your smartphone altogether. Minimize the number and/or days of emails you store on your phone, or better yet, save email and attachments to a server. Make it a habit to regularly move or delete anything you wouldn't want to share with strangers.

Practice App Awareness

An abundance of apps is both a blessing and a curse for smartphones—there is no way every app that makes it to market can be thoroughly vetted for 100 percent fail-safe security. By selecting reputable apps, backed by favorable user reviews, from a trusted source, you can diminish the risks. Avoid apps with scant reviews or that have only recently been uploaded. Also be cautious when granting an app permissions; consider the app's function and what it might reasonably need access to.

Keep Software/ Firmware Updated

Make sure you are running the latest versions of your apps, OS, and phone manufacturer software and firmware. This will ensure that any security holes are patched and your device is less vulnerable to hacks.

Disable Bluetooth and Wi-Fi When Not in Use

Unsecured wireless networks can be used by hackers to either attack your phone or steal information from it. You can protect yourself by keeping Wi-Fi and Bluetooth off when you don't need them. When wireless is needed, stick to known Wi-Fi networks using WPA2 and beware of public networks, which are sometimes set up by crooks to snare people's data.

When using Bluetooth, make sure it's in non-discoverable mode to avoid hacks like "Bluesnarfing" (stealing data), "Bluejacking" (sending unsolicited messages), and "Bluebugging" (listening in on your calls).

Beware of Links and Attachments

You've long been warned about the risks of opening strange links and attachments—particularly those arriving in unsolicited emails or text messages. All those same warnings apply to smartphones. And those warnings also apply to calling unfamiliar phone numbers received in messages, and clicking links for app "updates." You can ensure the authenticity of an update by going to the app's website.

SMARTPHONE AV

Add Extra Protection with a Third-Party Security App

Currently, smartphone malware infections are rare—nothing like what you see with PCs. But as proliferation of the devices grow, expect viruses, worms, and trojans to become more of an issue. To combat these threats, you need third-party software, and if you're like the majority of smartphone users, you don't have it. But even if malware isn't a pressing problem at the moment, a security app can offer other useful benefits, such as browsing protection, telephone and text-message spam blocking, and theft-protection features like locking down, wiping, or even locating a stolen phone.

You can find mobile security apps by many of the big names in PC protection. Independent security testing lab AV Comparatives (www.av-comparatives.org) recently evaluated mobile apps from ESET, F-Secure, Kaspersky, and Trend Micro and gave them all "Approved" designations. See the full report at http://bit.ly/cGRySZ.

Webmail Safety

How to keep your webmail account safe from prying eyes

In today's connected landscape where we enjoy Internet access not only from our desktops and notebooks, but also from our smartphones, tablets, and even our portable media players, it's easy to see why free-to-use webmail has become so popular. Most webmail accounts now offer several gigabytes of storage space, effectively turning us into digital pack rats.

Everything you choose to save—from sensitive email exchanges to confidential attachments—is not only accessible to you, but anyone who manages to figure out your password, whether by brute force dictionary attacks or by answering a series of weak security questions. And it's not just your email history that's in danger; an unsecure webmail account opens the door to other security breaches, like using your email account to send spam and spread viruses. Here are some ways you can avoid becoming just another statistic.

Create a Burly Password

Your webmail account is only as secure as your password, so use a strong one. The best way to do this is to use a combination of letters, numbers, and even symbols if your webmail provider allows. Avoid using real words at all costs, as these are easily cracked by any teenage hacker using a brute force dictionary script. For particularly sensitive accounts, use a random password generator (http://bit.ly/bf9oB2).

Use Multiple Passwords

The key to your house doesn't unlock your car door, nor does it work with your safety deposit box. If it did, you'd be three feet deep in dung if it ever fell into the wrong hands, and the same concept applies to your digital accounts. In practice, most people tend to use the same password for various accounts, and that's a rookie mistake. Use a different password for your email t forum login, and whatever else you do online. If you have trouble keeping track of them all, store your passwords in a virtual safe, like KeePass (free, http://keepass.info).

Log Out/Leave No Trace

It might be slightly inconvenient to log out of your webmail and clear your browser cache, but if your notebook ends up lost or stolen, you'll be glad you did. And if there are others around, log out and close your browser before heading off for a bathroom break.

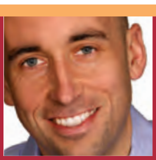
About Security Questions

Answering security questions can save your bacon if you forget your login credentials, but keep in mind that anyone who knows you well can probably guess the correct answer(s). Only rely on these if the questions are particularly personal in nature, or if you're allowed to create your own that are not easily guessable. And, for God's sake, don't publish that information in your Facebook profile. There's no point in having a security question of what city where you born in, or what your pet's name is if your public profile gives the answer away.

TOMORROW'S TORMENTORS

The 5 Biggest Future Threats

BY ENNIS FISCHER
KAPERSKY LABS



SMARTPHONE ATTACKS Smartphones such as BlackBerrys, iPhones, and Droids have become the go-to devices for email, text messaging, shopping, and online banking, and the attackers have taken notice. There have been some limited, narrowly focused attacks already, but this will increase significantly in the near future.

MALICIOUS APPS We've already seen a few malicious apps that have made their way into the various smartphone app stores, including iTunes and the Android Market. This is incredibly fertile ground for the bad guys, who are interested in compromising as many devices as possible and being as quiet about it as they can. A trojan disguised as a game or an online banking app is a quick way to do just that.

PRE-INFECTED HARDWARE DEVICES There have been a number of examples of USB keys, mobile phones, and even digital photo frames being infected with malware before they leave the factory. Expect to see more of this, including malware pre-installed on laptop hard drives, in the years ahead, because a small payment for every device infected is an easy way for a low-paid factory worker to make a lot of money quickly.

MAC ATTACKS As the Mac platform's popularity continues to grow, attackers will focus more and more of their attention on it. Expect to see more malware specifically designed to compromise Macs and iPhones as attackers begin to figure out useful attack vectors.

HIGHLY TARGETED PHISHING Mass phishing attacks are inefficient and attackers have turned their attention to highly targeted attacks, perhaps against a handful of key employees in a given organization who have access to valuable data. Emails that appear to come from a trusted customer, partner, or colleague and contain malicious PDFs or Excel spreadsheets have been a very successful vector and will continue to spread, especially among sophisticated attack crews with time and resources for reconnaissance.

Dennis Fisher is a security evangelist for Kaspersky Lab Americas.

Real-World Threats

Attacks in RL, or real life, are getting just as dangerous as those on your PC

ATM Skimmers

ATM skimming gets a lot of headlines but it's hard to say how much damage it's actually doing. The Secret Service tallies skimming in the "financial crimes" column, which hasn't moved much. In 2008, all financial crimes totaled $442 million. In 2009, the crimes totaled $443 million. While the chances of you getting skimmed are actually slim, that doesn't mean you should be blind to it.

Skimmers literally skim your debit card's data and PIN code when you use an ATM. The crooks accomplish this by placing incredibly detailed facades over an actual ATM. As you slide your card into the ATM, a mag reader in the device reads the magnetic stripe. These mag readers are incredibly small and usually designed to replicate the look of a normal mag reader interface. Then, either a pinhole camera or a faux keyboard laid over the actual ATM's keypad records your PIN entry.

The devices are usually installed in the middle of the night. After a few days, or sometimes a few hours, the crooks remove the device and collect the information. More advanced devices include Bluetooth radios so the crooks can download the stolen information remotely.

Scary? Yes. But there are a few steps you can take as a precaution.

Try to use ATMs that you are familiar with. This way, you're more likely to catch any tell-tale signs that something is amiss. If the ATM you have been using suddenly has a new or secondary safety mirror placed about the keyboard or a new pamphlet holder, take a closer look at the items or try to rock them to see if they will come off. Crooks will often place their surveillance cameras in these objects to capture you entering your PIN code.

Before you put your card in the ATM, try yanking or nudging the card reader. Skimmers are usually held on with double-stick tape or magnets and will easily be moved.

When you enter your PIN code, cover the keyboard as though you were protecting your hole card in a tough poker game.

Beware of people trying to "help" you with your ATM card and those who hover too closely while you enter your PIN code.

Crooks will occasionally pose as the police and call skimmer or pick-pocket victims and ask for the PIN code to the card.

Closely monitor your bank statements and immediately report suspicious activity to your bank.

NORMAL CARD INTAKE

ATM SKIMMER ATTACHED

ATM skimmers, like this one from an Australian bank, are designed to hide in plain sight. Often times, a second device will record your PIN code being entered into the ATM, too.

Gas Skimmers

What's scarier than an ATM skimmer? To us, it's the gas skimmer. Crooks are beginning to crack open gas pumps where they can install Bluetooth-enabled skimmer equipment. Unlike ATMs, which are alarmed and closely monitored by the banks, gas pumps are far less secure. Since the equipment is inline and sniffs the data coming from the keyboard on the gas pump, there are no external signs to look for as there are with ATMs. Crooks can leave the equipment in place for far longer than an ATM skimmer and can simply download the information via Bluetooth while parked in a nearby vehicle.

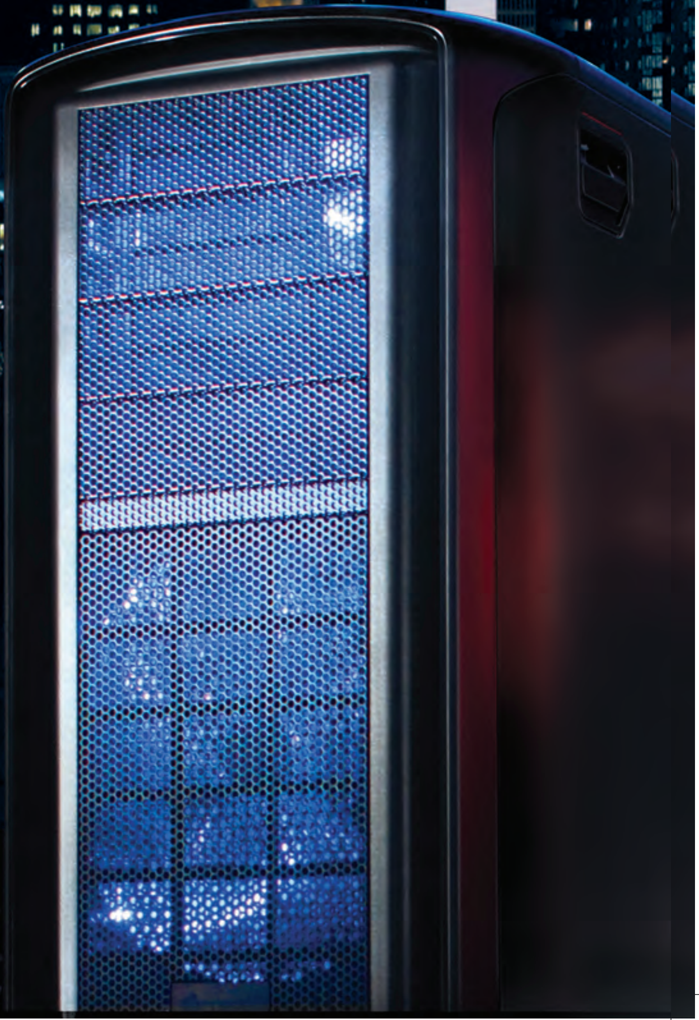
There isn't much to be done in this case, but there are a few steps you should take. Crooks are likely to tamper with pumps farther away from the cashier's booth where a surveillance camera is unlikely to catch them in the act. Using your debit card in credit card mode will only require you to enter your zip code, not your PIN code, so they won't be able to easily clone your card and use it at the ATM to withdraw or transfer funds. The third option is to just use cash or use your card inside the gas station. Just make sure you lock your car when you go inside.

Beware the 'Found' USB Key

What do you do if you find a USB key in the parking lot at work? You take it to the office and insert it in your work machine to see if you can find embarrassing pictures of a coworker. Instead, you've just been hacked with malware specifically targeted at the machines in your company. That had been just a proof-of-concept until the appearance of the Stuxnet worm, which targeted Iranian nuclear power plants in this manner. Although the worm is likely the work of a foreign intelligence agency, USB-based hacks emulating Stuxnet are expected. Even before Stuxnet, worms that spread by USB key have long been around. The fix is easy: Don't put that key in your machine. Also, consider disabling AutoRun on your machine. One way to easily do that is with the free app Panda USB and AutoRunVaccine (http://bit.ly/9XClno).

Disabling AutoRun in your OS can help prevent the spread of some USB-based malware.

Luxury



BY NATHAN EDWARDS

Are mid-towers the future of PC chassis design? Used to be that a mid-tower case was a compromise—an admission that you were willing to sacrifice a few features for a rig that could fit under your desk (or on top of it) without making drastic changes to your decor or furniture. Based on the products we've seen in the Lab over the last few months, those days are all but over.

The five chassis you see here are all gorgeous on the outside—in red, white, black, and blue—and packed with luxurious amenities on the inside. From a half-dozen (or more) hard drive bays to room for the longest videocards on the market to multispeed fan controllers, USB 3.0, and fans aplenty, these mid-towers can accommodate a full gaming build with aplomb.

As always, we evaluate cases based on build quality, aesthetics, ease of installation, and features. In this roundup, we're also introducing quantitative thermal testing to the mix in order to determine whether slapping a half-dozen fans into a chassis makes a difference compared to, say, two fans.

Read on to learn more about five of the hottest (or coolest) cases around.

Towers

Location, location, location!

These high-end PC enclosures are stacked and feature-packed

Whether you're rocking a big videocard or a boatload of drives, these deluxe mid-towers are move-in ready.

Lian Li PC-8FI

This all-aluminum tower is more sensible than the last Lian Li case we tested

We don't get Lian Li's spider obsession, but the rest of the PC-8FI is quite handsome.

Lian Li's chassis are renowned for their all-aluminum construction and superb build quality, but are also known equally well for costing a fortune and featuring questionable design choices. The mid-tower PC-8FI, thankfully, brings the legendary build quality, adds some nice new toolless touches, and for the most part eschews silly design elements—aside from a giant spider-shaped side window, that is.

The PC-8FI's drive-bay complement includes three optical drive bays (one with a front flip-down bezel, and one with a 3.5-inch adapter preinstalled) and six toolless 3.5-inch drive bays, one of which can be transformed to hold two 2.5-inch drives with the use of an included adapter. The fan loadout isn't the most comprehensive we've seen, but three 12cm red LED fans still manage to keep air moving through the case, and there's room at the top of the case for a 14cm exhaust fan. Lian Li even includes an extra mesh fan-cover for that hole.

The case's interior is generally well appointed: The motherboard tray includes the now-requisite CPU backplate cutout as well as several non-grommeted cable-routing holes. The PC-8FI also includes Lian Li's toolless PCI expansion slot–securing mechanism, and it works better on this chassis than we remember it working on previous models. It only covers seven of the case's eight expansion slots; the top one is used as a pass-through for the case's front-panel USB 3.0 cable.

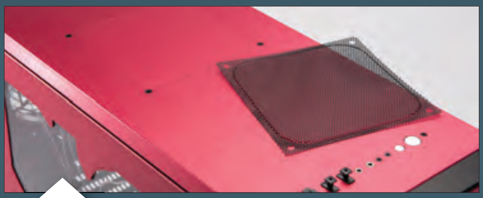
Unfortunately, the PC-8FI isn't without its annoyances. If you plan on routing the 8-pin ATX power cable behind the motherboard tray, you need to do so before installing the motherboard, or it won't fit through the routing hole. And you won't be able to run a graphics card measuring over 11.2 inches long unless you can figure out a way to run a computer without a hard drive. In other words, oversize videocards will only fit if you remove the hard drive cage entirely. And what kind of life is that?

Finally, the PC-8FI doesn't match the cooling prowess of some of the other cases in this roundup. Without side or top fans, CPU cooling is good but not great. And the GPU could definitely benefit from more airflow. The garish spider-shaped side window will not be to everyone's taste; if it doesn't suit you, you can save $40 or so by going for the black or silver versions of this case.

LIAN LI PC-8FI $220, www.lian-li.com	VERDICT **7**

You know what else is red and black? A Radeon 5970, which won't fit in this enclosure.

Lian Li's PCI expansion slot–retention mechanism—sometimes the first thing we remove from one of its cases—is better than ever.



The PC-8FI ships with a mesh cover for an optional 14cm fan. We wish the fan came with it, too.

Antec LanBoy Air

This new modular, open-air chassis lightens our dark little hearts

The LanBoy Air is mesh'd up.

Despite its fairly standard mid-tower dimensions—8.7 inches wide, 20.4 inches high, and 19.3 inches deep—the LanBoy Air is like no other case on the market. It's more like a cross between an Ikea end table and a Lego set, if a Lego set needed a screwdriver. Its motherboard tray is not only removable and separate from the back panel, but it can switch places with the PSU bracket, if you decide you want your PSU at the top of the case instead of the bottom. Feel like swapping the location of the two three-speed front fans with the three optical drive trays? Go for it—you can even alternate them if you want. The hard drive mounts are more like hammocks, complete with bungie cords, and can be oriented any way you like, though we'd recommend removing them before you move the machine for any reason. This flexibility enables the use of the longest graphics cards you can find. And the floor of the hard drive well includes mounts for two 2.5-inch drives.

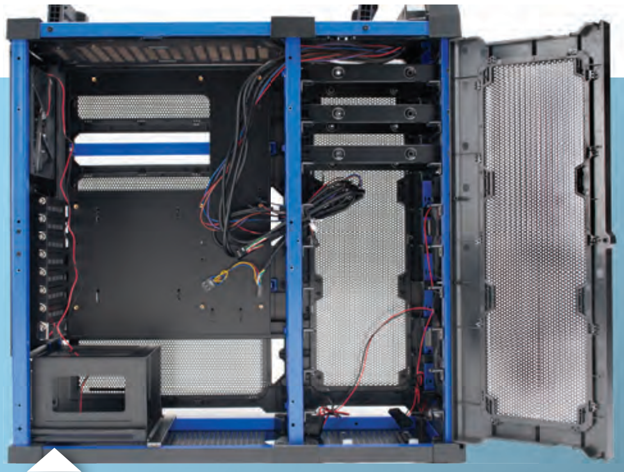
The LanBoy Air's five 12cm fans all direct air inward, creating positive air pressure that exits through the mesh wherever a fan is not located. Default fans include two three-speed front fans, two two-speed side-panel fans in front of the graphics cards, and one two-speed rear fan, though you can add an additional 10 fans at your leisure.

There's barely any room above the motherboard tray at all—no room to route the 8-pin ATX power cable, and none to add any fans to the inside top if you're using a skyscraper-style cooler. Though Antec boasts 10 additional fan mounts, rolling with the full complement of fans is overkill, in our view.

Antec's all-intake scheme leaves no obvious orientation for the skyscraper-style coolers that are today's leaders, but—much to our surprise—the LanBoy Air in its default configuration actually performed the best in our highly scientific cooling challenge. The two side-fans blowing directly on the GPU certainly seemed to help, and the all-in positive air-pressure approach actually worked better than more traditional airflow schemes.

We're not convinced this case won't turn into a DustBoy Air after six months, but we appreciate the modularity and the novelty that Antec has brought to the table here. With plenty of default fans, no end to the customization, and a great industrial look, Antec's got another winner here.

ANTEC LANBOY AIR VERDICT $200, www.antec.com	**8**


If you prefer your PSU on top, you can swap its position with the motherboard's.

A toolbox beneath the front fans holds the LanBoy Air's miscellaneous hardware and tucks away when not in use.

Bungee cords? On my *hard drives*? It's safer than it looks. But yikes.

BitFenix Survivor

Can you handle the newest mid-tower on the block?

With wraparound "SofTouch" coating, the Survivor is built to survive.

Cases with handles are nothing new. Cases billed as LAN-ready are nothing new, either. But BitFenix's first mid-tower chassis, the Survivor, has a wraparound rubberized plastic bumper that's kinda new. We love the so-called "SofTouch" coating on the case's wraparound shell—many editors said it was the coolest case they'd ever felt. We won't name names, but some Lab members wouldn't stop touching it, which disturbed us a little. The shell protects every corner on the machine—you have to remove two rear bumpers in order to remove the side panels—a slight inconvenience when building, but another step between your components and a hard surface (or a grabby thief) at a LAN event.

At 9 inches wide by 19.7 inches tall by 20.1 deep, the Survivor is around average size for a mid-tower. Its two three-slot hard drive bays have toolless trays for 3.5- and 2.5-inch drives, and the top one can be removed to accommodate the longest graphics cards. The mobo tray includes a large CPU backplate cutout and a few routing cutouts for power cables and its many front-panel connectors—two USB 3.0, two USB 2.0, eSATA, audio ports, and an on/off switch for the LEDs in the BitFenix logo and fans. There's no cutout for the 8-pin ATX cable, alas, but plenty of tie-down points on the rear of the motherboard tray still allow you to keep those cables tidy.

On the subject of fans: This is where the Survivor really falls short. Its two 20cm fans (front and top) just aren't enough. BitFenix's decision to ship the case with no side fans and no rear fan is mystifying, and the Survivor ran among the hottest of the cases we tested in this roundup. We've really seen the value of side intake fans during the course of this roundup, and the Survivor is absolutely begging for them.

We like the rugged good looks of the Survivor, even though its LAN-specific accoutrements (besides the handle, it also includes a peripheral lock and graphics-card strap) are of questionable practicality. It could definitely use a few more fans and a little more room, and the side panels are a pain to remove and replace. But for a LAN-ready mid-tower that can take a few hits, the Survivor is pretty rad.

VERDICT	7
BITFENIX SURVIVOR $110, www.bitfenix.com	

The pop-out handle on top seems a little wobbly but never faltered, and BitFenix rates it for up to 88 pounds.

The rubberized exterior extends to cradle the rear panel, and two pieces must be removed before the side panels can come off.

This pinboard, behind the right-side panel, connects the front-panel LED switch with the LEDs in the Survivor's case fans and front logo.

NZXT Phantom

Imperial styling for Jawa prices

The NZXT Phantom's glossy white coat and angular black mesh set it apart from the crowd.

The NZXT Phantom is gorgeous in a Dark Side kind of way—whether you opt for Darth Vader black, Imperial Guard red, or our favorite: Stormtrooper white. Though NZXT considers the Phantom a full-tower chassis, at 8.75 inches wide, 21.25 inches tall, and 24.5 inches deep (and with no EATX support), it's no taller or wider (and barely deeper) than the other mid-tower chassis that make up the rest of this roundup. The Phantom packs seven toolless hard drive trays in a dual-bay configuration that (hooray!) leaves room for long cards like the Radeon HD 5970. We're not crazy about front-panel doors like the one that covers the Phantom's five (toolless) optical drive bays, but the Phantom's door is at least nicely weighted and has a magnetic latch.

The Phantom's motherboard tray packs the requisite CPU backplate cutout, four grommeted cable-routing holes, and plenty of tie-downs. The rear panel carries a 12cm exhaust fan, seven PCI expansion slots, grommeted holes for water-cooling, and a button that controls the Phantom's top 20cm fan's blue LEDs. In addition to the rear 12cm fan, the Phantom comes standard with two 12cm side-panel intake fans and a 20cm top exhaust fan. It also includes mounts for a 20cm (filtered) side intake fan, a 12cm or 14cm front intake fan, and—up top—room for an additional 20cm fan, a 24cm dual radiator, or both. This gives you the choice between two 20cm fans, two 20cm fans and a radiator, or two 12cm fans and a radiator. Every fan or potential fan in the case can be controlled using a gorgeous front-panel fan controller. The front-panel connectors are limited to audio, two USB 2.0, and eSATA. This is the only case in our roundup without front-panel USB 3.0.

We expected the lack of a front fan to hurt the Phantom's cooling performance, and it did. Though its CPU cooling score was second-worst in the pack, GPU and system temperatures ran as cool as the LanBoy Air—once again proving the merit of side intake fans. With the addition of a front intake fan, the Phantom could offer cooling performance to match its astounding looks. And given that the Phantom costs just $140, you'll have plenty of cash left over for a fan or two.

VERDICT	
NZXT PHANTOM $140, www.nzxt.com	**9**

We're glad NZXT spent as much time on the Phantom's interior as it did on the exterior.

The fan control panel is minimal, gorgeous, and initially confusing.

Pop off the front bezel and install an intake fan. DO IT.

Corsair 600T

A long-awaited mid-tower chassis from the makers of our favorite full-tower

Corsair opted for a more standard airflow scheme for the 600T.

It's no secret that we really like Corsair's full-tower case, the 800D. That chassis earned a Kick Ass Award for its no-nonsense exterior, gloriously roomy interior, and its mysterious ability to make every build look fantastic. Of course, it was enormous and cost close to $300. So we had high hopes for the mid-tower 600T: Sure, it's graphite-colored and clad in (gasp!) curvy plastic, but it's still Corsair on the inside, right?

The 600T is big for a mid-tower. At 10.4 inches wide by 20 inches high by 23.3 inches deep, it's the widest case in our lineup. The bowed-out side panels, which latch at the top rather than in the rear, are among the best side panels we've ever worked with. There's plenty of room behind the left-side panel for cable routing, along with lots of convenient extras. Giant CPU backplate cutout? ATX 8-pin cable cutout? Eight grommeted cable-routing cutouts? Yes, yes, and yes.

Like the 800D, the 600T is an absolute pleasure to build in. Its two three-bay drive cages are both movable—the top one can be moved so it sits between the PSU and bottom drive cage, and the lower drive cage is removable, too. The case easily accommodates a Radeon HD 5970 even without moving the top hard drive cage.

The 600T eschews the 800D's bottom-up cooling scheme in favor of a more straightforward front-to-back strategy with front and top 20cm fans as well as a 12cm rear exhaust fan. There's plenty of room at the top of the case for a dual radiator or a giant back-mounted cooling loop, such as Corsair's H70, with its thick radiator and dual fans. The eight PCI-E slots include one that acts as a USB 3.0 pass-through for the front-panel ports.

The Corsair's lack of a side fan is its only real downside—GPU temperatures were the highest of any in this roundup, though CPU and system temperatures were on the cooler side. Fans of Corsair's earlier, more squared-off aesthetic may not find glossy graphite-colored plastic and steel to their taste. However, minor quibbles aside, Corsair has created another case that's a joy to work with, with an aesthetic all its own. And at $160, it's not breaking the bank.

VERDICT	
CORSAIR GRAPHITE SERIES 600T $160, www.corsair com	**9**

All these cable-routing cutouts make the 600T a joy to build in.

The Corsair 600T's intake mesh clicks off for easy cleaning.

Beneath the top mesh there's room for a dual radiator, plus a side-panel barrel lock.

AND THE WINNER IS...

A slate of worthy contenders makes it tough to choose a victor

The five competitors in this roundup are some of the newest, hottest, most talked-about cases from vendors new and old, and there isn't a case in the bunch that we wouldn't recommend to somebody. As always, it just depends on what your priorities are. If you want a light, well-constructed case and don't care about cost or running a Radeon 5970, go for the Lian Li. If you like a more novel, modular look and want a lot of airflow, we recommend the Antec LanBoy Air. The BitFenix Survivor is great for carting around to LANs, and the Corsair 600T is great to build into.

If we have to pick a winner—and we do—we're going with the NZXT Phantom, with the Corsair running a close second. Both have great looks, superb build quality, and attention to detail on the inside. Neither are perfect—the lack of front-panel USB 3.0 and a front fan hurts the Phantom, while the Corsair could use a side-panel fan to keep GPU temperatures down. But you won't go wrong with either of them—or any case in this roundup.

BENCHMARKS

	LIAN LI PC-8FI	ANTEC LANBOY AIR	BITFENIX SURVIVOR	NZXT PHANTOM	CORSAIR 600T
CPU Temp @ 100% burn (C)	47.5	**46.5**	52.5	49	47.75
CPU Temp @ idle (C)	33.25	**30**	35.25	31.75	32
GPU Temp (C)	60	**54**	59	**54**	62
System Temp (C)	**32**	**32**	36	33	35

Best scores are bolded. For our case testing, we use an EVGA 680SLI motherboard, stock-clocked Q6700 with a Thermaltake Contac29 cooler, an Nvidia 8800 GTX (with a Radeon 5970 for size testing), and a Corsair AX850 power supply. We use the case's stock complement of fans on their highest settings.

PROGNOSTICATION

Look How Far We've Come

NATHAN EDWARDS
SENIOR ASSOCIATE EDITOR

Back in April 2009, we rounded up five full-tower chassis, from budget to lush. At the end, we posted a wish-list of features we thought should be standard in every case: 2.5-inch drive bays (for the growing SSD market), mid-case air ducts, SATA backplanes, intake dust filters, variable-speed fan controllers, cable-routing mechanisms, toolless PCI slots, and quality thumbscrews. So, how did we do?

Every case in this roundup had mounts for at least two 2.5-inch drives, and most included trays that accommodate 2.5- or 3.5-inch drives. We didn't see mid-case air ducts, but the cases with side intake fans showed lower system and GPU temps than their competitors. SATA backplanes were noticeably absent, but other cases feature them. Every case in the roundup had cable-routing options, and some featured toolless PCI slots and variable fan controllers. Most had decent thumbscrews.

There were some features we didn't mention then that have now become standard. Every case we tested this month featured a large cutout in the motherboard tray to accommodate CPU coolers with backplates, and all but the Phantom had USB 3.0 front-panel connectors. None had unfinished interiors, and toolless drive bays have also become the norm.

The bottom line: Case design has come a long way in the past 20 months, and it's only getting better from here.

at&t
XBOX
LIVE
Me
SAMSUNG

People

Pictures

14
Phone

htc
T··Mobile·
Phone
People
Messaging
Outlook
XBOX
LIVE
Me

Windows Phone 7: Ready for Action

With the release of its most important operating system to date, Microsoft hopes to pull off the biggest technology upset of all time

BY GEORGE JONES

Ultimately, the colorful, striking home screen is the first thing people notice about any Windows Phone 7 smartphone, and that's a good thing. In fact, it is the best possible reaction Microsoft could hope for.

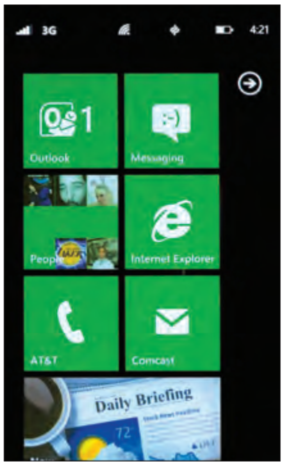
The truth is that, given the large gap between Microsoft and its competition, namely Android and the iPhone, anything less than extraordinary would have doomed Windows Phone 7 from the start. There's a greater truth here, however—one that has heretofore gone unspoken. Since U.S. Robotics' debut of the Palm Pilot in 1996, we've been essentially stuck with the same look and feel for our PDAs and smartphones. Sure, Android extends the desktop metaphor a little bit, but isn't it pretty much a Windows/Mac desktop?

So, we're happy to see something different. And we're slightly surprised to see such a refined and polished mobile operating system. It's not perfect though. Windows Phone lacks deep layers of customization and cut/copy/paste functionality, and there's a dearth of third-party app support. But it's different in a good way, so much so that critics are having a hard time identifying what it is about this fledgling OS that makes people so happy. That's a good sign for Microsoft and a better sign for all of us.

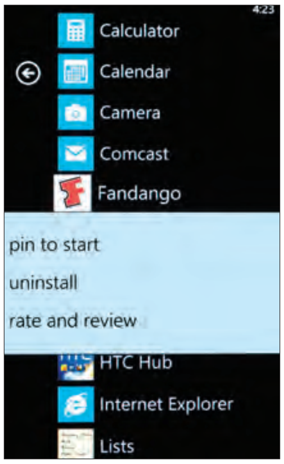
Over the next four pages, we're going to take a deeper look at the OS and pit it in a head-to-head battle against Google Android. Welcome to the smartphone party, Microsoft. You're late, but we're glad you're here.

Digging into the OS

There's only one way Microsoft could earn a ticket to the mobile phone dance: getting Windows Phone 7 right on the first try



Windows Phone's large icons are key; this design makes it much easier to see updates and notifications at a glance.



You can place just about anything—people, apps, songs, podcasts, and more—on the home screen.

The core of Windows Phone 7 is the home screen and its symmetrical, Mondrian-style arrangement of large square tiles, each of which provides entry into a basic task such as email, web browsing, games, text messaging, calendars, and more. These tiles are plainly labeled and are "live," meaning that the OS constantly updates them with new alerts in real time.

Beneath this striking design, however, lies a number of step-saving efficiencies. Across the board, the WinPhone interface consistently removes one to two steps from almost every single smartphone task we perform on a day-to-day basis. The only real exception to this is the ability to instantly read news, weather, and social updates via the desktop widgets that Android permits.

As a general rule, the level of customization consistently disappointed us. You can customize the placement of individual tiles on the Start screen—an extended press on an icon allows you to drag it around the home screen and place it wherever you'd like. You can also "pin" just about anything—applications, websites, photos, games, people, podcasts, and more—to the home screen in the same manner. After just under a week of usage, we wanted to adjust the color and/or size of individual tiles. We wanted to leave a row of tiles blank in order to group our applications. We want to change font sizes. None of this is currently possible.

EMAIL AND OFFICE

Unrealistically, we expected that because Exchange and Outlook are Microsoft products, Outlook in Windows Phone 7 would function in some kind of special manner. We were misguided. Performance around message delivery and syncing is identical to Android and the iPhone. Critics and users have groaned about the lack of a unified inbox that lumps all of our emails together. Our take: It's a nicety, but not a necessity. These days, most of us use separate inboxes to reflect our various personas—worker bee, family man, pervert—so the separation makes sense. SMS texting utilizes the now-standard threaded approach, with each SMS conversation housed in a separate window.

We were pleasantly surprised by the high level of functionality the built-in (and free!) mobile Microsoft Office suite allows. Most of the basic formatting and font options are here. If you're a PowerPoint maestro, be warned: You can create and edit Word and Excel documents, but you can only edit pre-existing PPT decks. We were surprised to discover that you

WINPHONE HARDWARE

Three Windows Phone 7 Devices Reviewed

HTC SURROUND

This is the first smartphone we've seen with a slide-out set of stereo speakers, which support Dolby's new mobile standard. Frankly, we'd prefer a keyboard, but the HTC Surround's speakers drive home the point that Windows Phone devices are great for music. If only this one packed musical punch. In head-to-head testing, the HTC Incredible pumped out as much volume and sounded just as good.

The nice thing about the speakers is that they lend this smartphone a nice heft. The Surround (an AT&T phone) measures 4.7x2.4x0.5 inches, and has 16GB of internal memory; our review unit had an available slot for a microSD card. Its battery life was the best of the phones we tested, probably because its 3.8-inch TFT LCD capacitive multitouch 480x800 screen was the smallest of the three. Like all three phones reviewed here, performance in web browsing and general navigation was snappy. If it had a keyboard instead of useless pop-up speakers, this would be perfect.

VERDICT **6**

HTC SURROUND
$200 with two-year commitment ($500 otherwise), www.htc.cpm

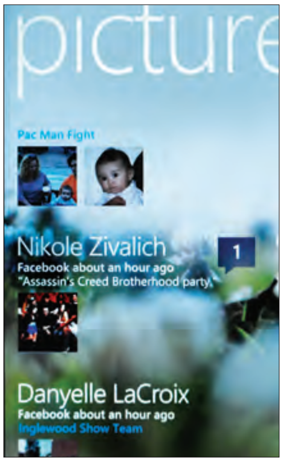
SAMSUNG FOCUS

The first thing we noticed and appreciated about Samsung's first WinPhone (for AT&T) is its gorgeous four-inch 480x800 Super AMOLED screen, which is vastly superior to the screens on the other two phones reviewed here. The upside of Super AMOLED is that the touch layer of the screen is embedded in the glass, which reduces the weight of the phone. The Focus appears to be constructed almost entirely of plastic, which explains its weight of 4.3 ounces—remarkable for

can only save your documents locally or on a Sharepoint server, and not to Microsoft's cloud-based SkyDrive service. (You can automatically save your photos to SkyDrive, however.)

Given the prevalence of touch-screen smartphones, the quality of WinPhone's virtual keyboard is important. We confess to feeling initially disappointed. In comparison to the competition, it feels too small and the keys are too crowded, particularly in landscape mode. We were pleased to discover that the virtual keyboard's adaptive traits were top-notch. It constantly adapted to and corrected the errors caused by our clumsy, meaty thumbs.

The Xbox Live channel functions as a games marketplace and a place to check in on your Gamerscore.



The photos channel allows you to see the pictures your Facebook and Live friends have taken.

GAMES, MUSIC, PEOPLE, AND MORE

One significant change is the way the OS treats your friends and social networks. Instead of shunting your social life into a series of applications, Microsoft has created a dedicated channel—People—that allows you to keep track of all your real and faux friends' posts, status updates, and more. This aggregated view also extends to the Photos category of the OS—here you can see all of your friends' most recent photo posts.

The integrated Zune support is a beautiful thing; it essentially means that every WinPhone is also a Zune HD. You can download and stream the entire Zune catalog of music, podcasts, and videos. The only exception to this rule is that, for some reason, you can't stream or download Zune music channels. The Zune PC software functions as a sync client for WinPhone devices in the same manner that iTunes does for iPhones. Plugging your device into your PC initiates an automatic two-way sync (if you prefer), although you can also set up your phone to sync with your home PC via the wireless network if you prefer.

Application support is clearly Windows Phone's biggest weakness. At launch, some hyper-basic categories such as instant messaging, Dropbox, and Google Voice weren't available. That's a big concern. It's probably just a matter of time before we see thousands of apps filling Windows Phone 7's marketplace. But if you're looking for apps right now, you'll be sorely disappointed.

IN CONCLUSION

Days after the launch, one of *Maximum PC*'s Facebook fans, I Jedi, summed things up with a key question about Windows Phone 7: What is Microsoft bringing to the table that will encourage adoption of its platform? It's a fair question. The user interface design is so strikingly different that everyone wants to touch it. That's a great start. But smartphone users are going to need more from WinPhones. More apps, more features, more functionality. More.

We confess to being intrigued and enamored by Windows Phone 7 as much for what it does well now as for what it might accomplish in the future. In 12 months' time, we envision a mobile OS with built-in remote connectivity to our desktop, our media server, and our home network. We envision a massive games library, with deep hooks to our Windows and Xbox games. We see built-in file sharing via SkyDrive. And yes, we see cut and paste.

The 12–18 month smartphone-upgrade cycle we all live by means that Microsoft has definitely inserted itself into the smartphone conversation. We'll see what happens next.

such a large (4.9x2.54x0.4-inch) device. The only real downside of the plastic is that it makes for a slippery phone. During our first few days of use, we found it constantly slipping from our grip.

In general, we've found that this first batch of WinPhones possess superior battery life to similarly high-end Android devices, like the Epic 4G and the HTC Incredible. Keeping with this theme, the Focus's battery easily lasted an entire day without charging.

During testing, the Samsung quickly became our favorite. Its only weakness is 8GB of internal memory, although this can be expanded via a microSD slot.

VERDICT **9**

SAMSUNG FOCUS
$200 with two-year commitment ($500 otherwise), www.samsung.cpm

HTC HD7

HTC's version of the WinPhone for T-Mobile emphasizes a sturdy aluminum build and a gigantic 4.3-inch TFT LCD screen, making it the most visually striking smartphone reviewed here. Unfortunately, while the jumbo-size 480x800 screen is nice, the colors literally paled in comparison to the Samsung Focus. This is a minor bump, however, because the 4.8x2.7x0.4-inch HD7, which weighs 5.7 ounces, felt great in our hands.

Like the other three phones here, the HD7 has a 1GHz Snapdragon processor and a 5-megapixel camera, although it is the only phone to have dual flash. It has 16GB of internal memory and permits expansion through a microSD slot. Battery life is solid—the phone made it through a day of heavy use without charging—but it's not as good as the HTC Surround or the Samsung Focus.

VERDICT **8**

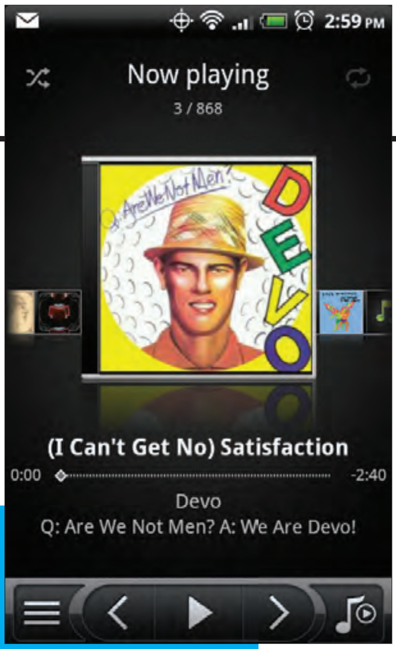
HTC HD7
$200 with two-year commitment ($500 otherwise), www.htc.cpm

DEATHMATCH

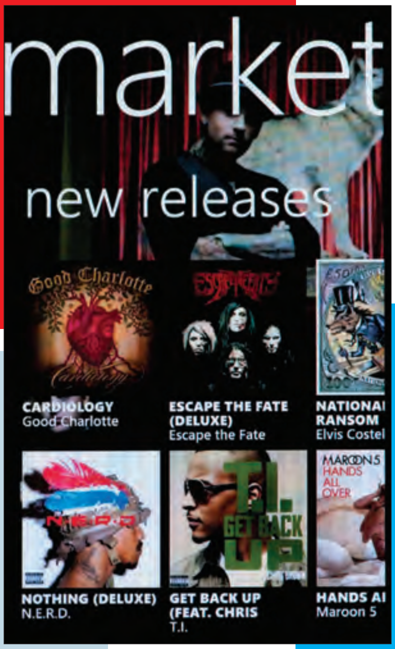
Windows Phone vs. Android

Previously, in Smartphone Deathmatch (November 2010): In a surprise upset, Google Android bested both Blackberry and Apple iOS on the merits of its customization, flexibility, and rapidly swelling application support. This month, we're tossing Windows Phone 7 in the cage with the iPhone killer. Can Microsoft's fledgling mobile OS hold its own against a pack of angry Androids? It's time to find out. –GEORGE JONES

ANDROID



WINDOWS PHONE



Rumor has it that Android has a music marketplace in the works, but Zune has one now, and it's polished and functional.

ROUND 1

EASE OF USE The Windows Phone home screen is everything we want in a phone: attractive, dynamic, and functional. Android's home screens are more customizable and we love the ability to place widgets, but ultimately, the desktop metaphor feels a little dated. WinPhone's use of categories trumps the all-in-one approach of Android. Overall, Microsoft has created a much easier at-a-glance interface. We considered penalizing Windows Phone 7 for the absence of cut/paste, but then we tried to remember the last time we used it on our phone, and could not.

WINNER: WINDOWS PHONE

ROUND 2

FLEXIBILITY AND CUSTOMIZATION Microsoft has emphasized simplicity in its mobile operating system, and the end result is that, aside from the ability to tweak the colors and position of the tiles on the home page, you can't change very much of the interface at all. We love Android in this regard, as it allows us an abundance of control over our mobile environment. You can change pretty much every single element of the desktop, applications, and power-management settings.

WINNER: ANDROID

ROUND 3

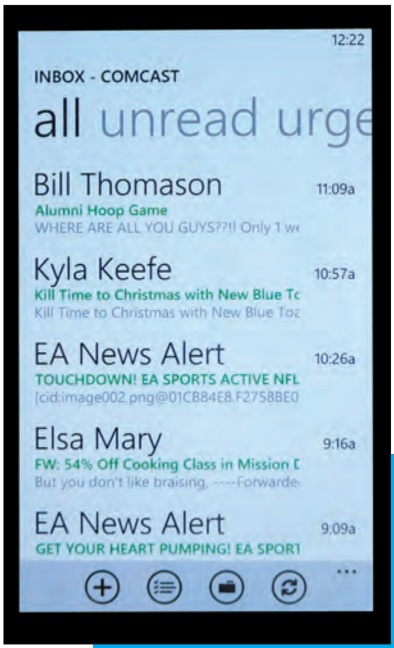
APPLICATION AND DEVELOPER SUPPORT Android has more than 100,000 apps. At launch, Windows Phone had only a few thousand, and was missing some big categories, such as all Google apps (no surprise there), instant messaging, and more. Over time, Microsoft will catch up—and WinPhone's use of achievements in games is novel—but right now, this category is a no-brainer.

WINNER: ANDROID

ROUND 4

EMAIL AND MESSAGING Both operating systems' email clients are easy to set up and offer built-in support for Exchange, Gmail, Yahoo, and POP. Microsoft's interface and color design is slightly superior to Android's, mostly because we can see three lines of text in the default view. Although Windows Phone's threaded SMS text messaging looks and feels better than Android's, you can download superior third-party text clients from the Android Marketplace. This one's too close to call, mostly because both messaging clients are top-notch.
WINNER: DRAW

WINDOWS PHONE

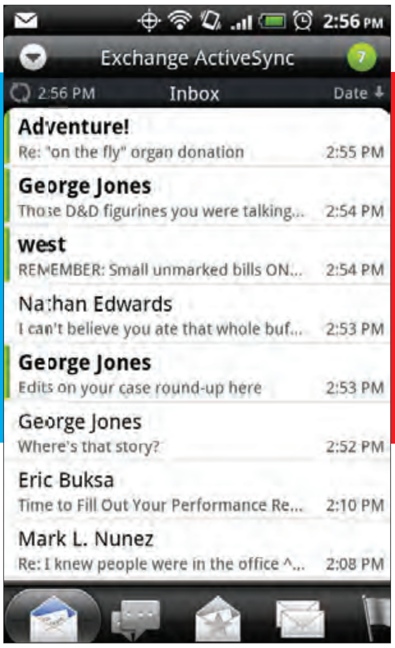


Email is easy to set up in both operating systems, but it's much easier to read and manage in Windows Phone.

ROUND 5

MEDIA STORAGE AND PLAYBACK Android is flexible in the manner it deals with media. You can sync up music using Windows Media Player, or any other sync client (except Zune and iTunes), and you can drag/drop directly from Windows to your device. Windows Phone works extremely well with Zune, which allows you access to a massive music library for $15 per month, and also grants you à la carte access to movies and TV shows. And you can sync your phone wirelessly with your PC.
WINNER: WINDOWS PHONE

ANDROID



ROUND 6

PHOTOS AND STORAGE These days, almost all of us are walking around with the equivalent of several rolls of film in our pockets. The question, as always, is what the hell do we do with all these photos? Both Android and Windows Phone offer easy ways of viewing the pictures we've taken. This said, Windows Phone's ability to upload photos automatically to Facebook or SkyDrive, and the ability to view all of our friends' photographs as well, is so innovative we wish we'd thought of it.
WINNER: WINDOWS PHONE

And the Winner Is...

The fact that Microsoft is in the mobile conversation at all feels like a minor miracle. When the company announced that it was delaying Windows Phone 7 earlier this year, we thought that was the kiss of death. Instead, holy cow! This is a unique, good-looking mobile OS. It's still a 1.0 version, and doesn't come close to approaching the levels of customization available to Android users. But between the intuitive use of categories for basic smartphone tasks, Zune integration, and a cleaner look and feel, we have to declare Windows Phone the winner.

One final thought: One of the things we haven't mentioned in this Deathmatch is battery life. Ultimately, it wouldn't be fair because hardware and battery size/type are a big part of the equation. However, our tests have made it clear that the Windows Phone OS is far less battery-intensive than Android. As we see more devices, we'll investigate further.

WHITE PAPER

HDBaseT

A single Ethernet cable can provide HDMI, power, and data across 100 meters –ZACK STERN

HDBaseT could replace many of your electronics connectors—HDMI, 100BaseT Ethernet, USB, and power—using a single, lowly Cat 5e or Cat 6 Ethernet cable. The technology streamlines your wiring, permits connections to multiple displays/receivers, and greatly extends your reach with no signal degradation. With this emerging technology, an HDBaseT Blu-ray player can sit 100 meters from a connected TV.

How does HDBaseT fit so many signals into an Ethernet cable? We'll explain the technology and how it can simplify electronics connections while enabling new features.

SIGNALING THE FUTURE

Like Intel's Light Peak, HDBaseT passes data through established electronic signals instead of creating its own. Unlike Intel's fiber-optic take, HDBaseT uses standard Ethernet cables, so it's cheap. An added bonus is that many buildings and homes already possess the necessary infrastructure.

Home theater devices such as Blu-ray players rely on a traditional HDMI chip to encode the video. An HDBaseT digital signal processor takes this signal and modifies it to run over Ethernet. The process uses pulse-amplitude modulation (PAM), which encodes and rapidly pulses data at varying levels of voltage. A decoder on the other end turns the information back into a native HDMI signal.

While the PAM technique functions in the same basic manner as in gigabit and 10-gigabit Ethernet and uses the same cables, HDBaseT follows a proprietary modulation scheme. Only the physical cables are used, not the underlying Ethernet packet structure. Even HDBaseT's 100Mb/s Ethernet gets encoded in this way, although an HDBaseT port can revert to plain Ethernet, skipping HDMI and other features, if you accidentally (or deliberately) plug into a traditional Ethernet network. HDBaseT uses its own physical switches, too, although hybrid versions that interface with standard Ethernet are in development.

Version 1.0 of the HDBaseT specification has already been locked in, and specifies a data rate of about 8Gb/s. Even though HDMI requires 10.2Gb/s, the process still works and leaves room for other signals because it is more selective. Micha Risling, marketing committee chair for the HDBaseT Alliance, says, "More than 3Gb/s for HDMI is for error correction…. We don't need that because the modulation that we're using is stronger than that specific error correction." So, HDBaseT skips the standard HDMI error-correction process.

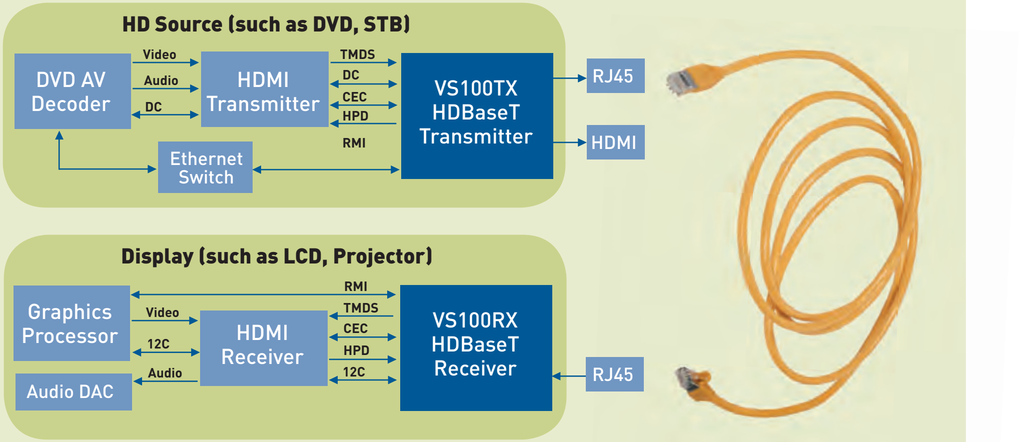
HDBaseT is capable of an even greater data rate, allowing for gigabit Ethernet or future bandwidth added to HDMI. The process would use the same cables but modulate the signal at a faster rate, requiring a more expensive DSP. The HDBaseT Alliance is planning for that in future iterations of the specification.

Even though the HDMI error-correction overhead isn't used, the full HDMI 1.4 list of uncompressed video and audio formats are supported, including HDCP and the methods of handling 3D frames. However, the first HDBaseT devices omit a few features that require an HDMI 1.4 chip, such as audio-return channel. Risling says chip provider Valens Semiconductor (where he also works) has new HDBaseT chips ready for consumer electronics companies that are compatible with all HDMI 1.4 features.

While HDBaseT is built around HDMI, its other signal capacities add versatility. Data and control channels include support for USB, IR, HDMI's CEC, and RS-232. This means that even though your TV and Blu-ray player may be in different rooms, your IR remote can still pause, play, and do

HOW IT WORKS

HDBaseT Signal Transmission



At its core, HDBaseT consists of three steps. A DSP encodes the AV signal and associated data, including IR commands. This data is transmitted over RJ-45 cabling to a receiver, which decodes the signal, which is then passed on to a receiver or TV.

everything else. Just like HDMI, these signals are passed from their processors and encoded into the HDBaseT PAM signal.

HDBaseT also layers power into the mix, based on the Power over Ethernet standard (PoE+). Unlike that method, however, which tops out at 25.5 watts, HDBaseT can supply up to 100 watts of power.

The standard was designed to span 100 meters because that's already the established limit for Ethernet networks. HDBaseT can go farther in some situations, or you can add up to five switches to jump additional 100-meter lengths. Content providers also get a say in your distance; an optional setting could keep you to 100 meters total so you don't broadcast Blu-ray movies to the neighbors. The HDBaseT Alliance says hardware could activate the restriction based on a DRM flag embedded in the content.

DEVICE MANAGER

We're used to consortiums forming, discussing standards for years, then finally shipping hardware. HDBaseT is on a faster track since Valens designed the chip first, and then formed the consortium with LG, Samsung, and Sony Pictures Entertainment in June 2010. Valens started selling the HDBaseT chips to its vendors in almost the same step.

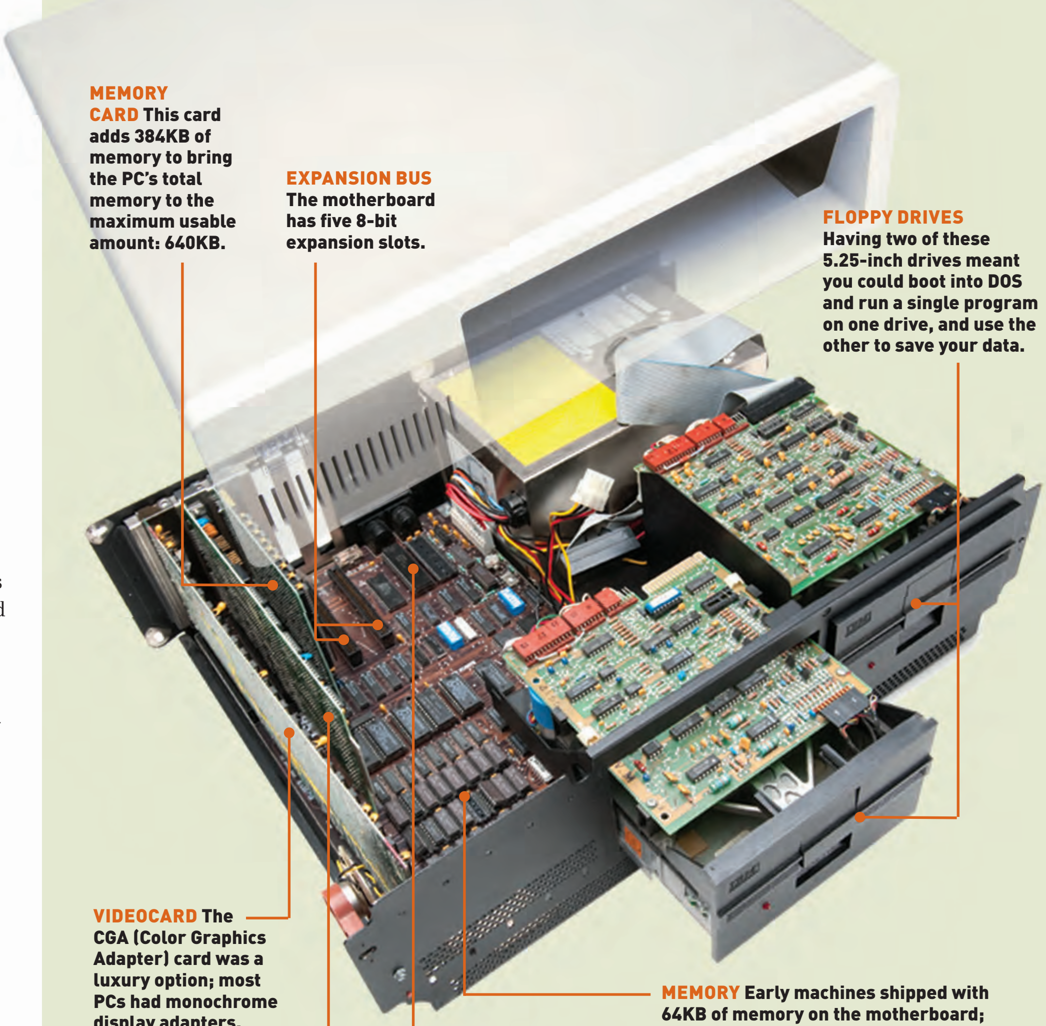
HDBaseT devices from AMX, Crestron, and Gefen already exist, and the HDBaseT alliance hopes that consumer devices such as TVs and Blu-ray players with an all-important built-in connection will come soon. Risling says, "We do expect to see consumer electronics products using HDBaseT in 2011 by more than one vendor."

The biggest challenge facing the emerging technology is price; currently available signal extenders can cost $700 or more. Valens didn't detail its specific chip costs, but hopes the costs will quickly come down to a few dollars per device. Risling says, "One of the reasons we have companies such as LG and Samsung and Sony [Pictures] joining the alliance is because they believe it's doable."

Our wallets ache whenever a new standard takes hold. But if HDBaseT becomes popular, its added features might make home theater component upgrades worthwhile.

IBM PC Model 5150

It's not the first personal computer by a long shot, but its introduction in 1981 jump-started the entire PC industry, thanks to its prodigious use of non-proprietary hardware and an architecture that allowed buyers to expand and customize the machine for almost any purpose imaginable.



MEMORY CARD This card adds 384KB of memory to bring the PC's total memory to the maximum usable amount: 640KB.

EXPANSION BUS The motherboard has five 8-bit expansion slots.

FLOPPY DRIVES Having two of these 5.25-inch drives meant you could boot into DOS and run a single program on one drive, and use the other to save your data.

VIDEOCARD The CGA (Color Graphics Adapter) card was a luxury option; most PCs had monochrome display adapters. The card had 16KB of video memory and delivered 16 colors at a maximum resolution of 640x200 pixels.

MEMORY Early machines shipped with 64KB of memory on the motherboard; this one, built in 1986, features 256KB of memory.

FLOPPY-DRIVE CONTROLLER This card controls the two floppy drives and also has a parallel printer port on its mounting bracket.

CPU Intel's 8088 boasted an 8-bit external data bus and was capable of addressing a full megabyte of memory. It ran at 4.77MHz. You could enhance your PC's math prowess by plugging Intel's 8087 floating-point coprocessor into the empty socket on the right.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

Step-by-Step Guides to Improving Your PC

THIS MONTH

58 ORGANIZE YOUR MEDIA WITH XBMC

WINDOWS MEDIA CENTER VS. XBMC

ALEX CASTLE
ONLINE MANAGING EDITOR

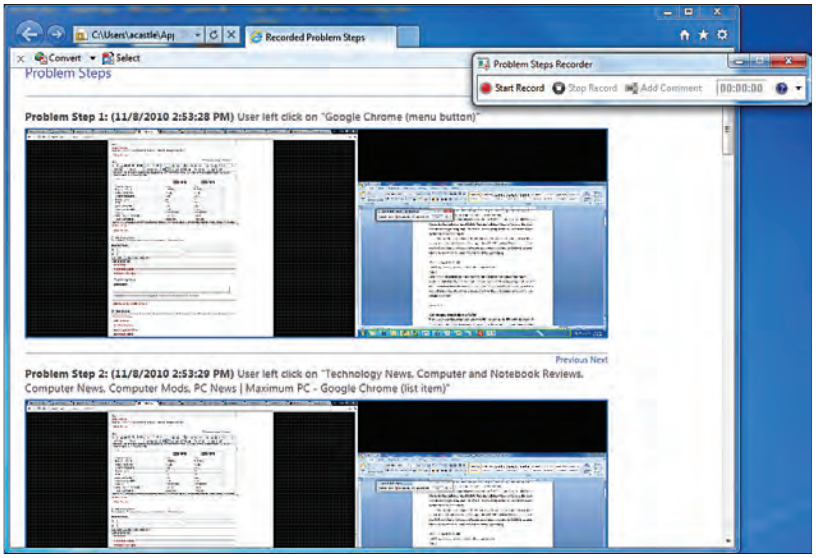
This month, we're bringing you a how-to about our favorite media front end, XBMC. I realize this could be a controversial choice, so let me give a little background about why we picked XBMC over the also-very-popular Windows Media Center.

Now, there are a couple of great reasons to love WMC. For one, it comes with Windows. Not that it's that hard to download XBMC, but being built into Windows 7 is a big plus. Also, it's a bit easier to get set up, and—let's face it—it looks pretty damn nice. Also, it works with Netflix, which is almost a must.

That said, here's why I prefer XBMC: For one, it's open source, which I always like to support. Also, it has off-the-charts OS compatibility—XBMC works in Windows, Linux, and even OS X. And finally, the breadth of customization options available for XBMC is superior, which means more choice. And more choice is always a good thing.

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

WINDOWS TIP OF THE MONTH



Diagnose Your Issue with the Problem Steps Recorder

Even the most stalwart PC pro sometimes runs into a problem that requires some expert assistance. Unfortunately, it can be tough to explain exactly what's going wrong. That's what the Windows Problem Steps Recorder is for. Just hit Win + R, type prs.exe, and hit record. The PSR will keep a detailed log (with screenshots) of everything that happens on your PC as you recreate the problem.

Organize Your Media with XBMC

So, you've got a terabyte of media on your home PC—movies, music, TV shows, the works. On top of that, you like to watch streaming videos on the web and listen to Internet radio. Isn't the future great? But how are you getting at all this media? Do you keep all your files in folders on your desktop, or are they just sitting on a NAS box? Maybe you use something like iTunes, and then fire up your browser to get at streaming content.

There's a better way.

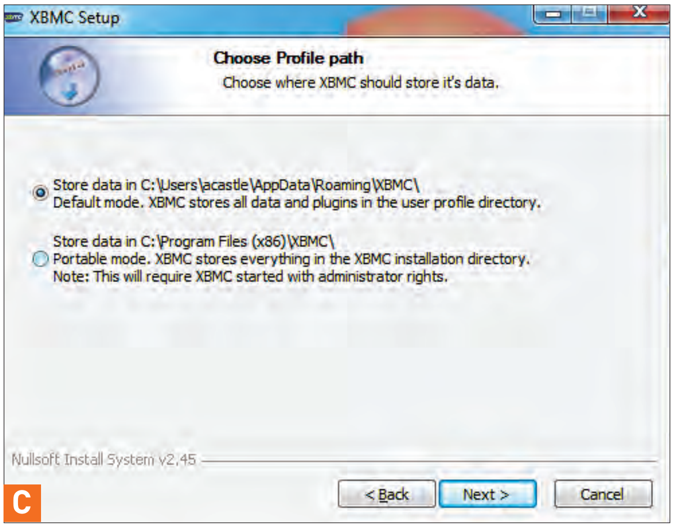
What you need is a media front end, which can help you organize and access all your media, whether it's files on your system or in the cloud. In this article, we'll show you everything you need to do to get XBMC—a popular media front end—up, running, and customized. –ALEX CASTLE

1 GETTING STARTED

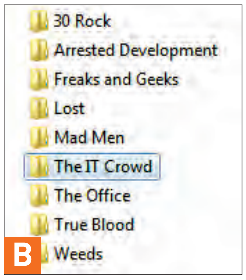
Before you begin, consider these questions:

Is XBMC right for me? XBMC (originally designed as the Xbox Media Center for hacked Xboxes, but now mostly for HTPCs) is the most compelling and full-featured media front end currently available (image A). However, not *everyone* needs a media front end. If you're a music-only sort of person, for instance, you might be better off using iTunes or Foobar. If the only media you need is streamed from Netflix, then you're better off just sticking to the site.

Is my hardware ready to run XBMC? Fortunately, XBMC does not come with heavy system requirements. As long as you've got a semi-modern computer running Windows, Linux, or OS X (don't worry Mac-haters, we're only going to focus on the Windows version in this article), you should be able to run XBMC. Really, the most stringent requirements will end up coming from the media files themselves. If your computer can run HD H.264 video, then it's more than sufficient for XBMC.



Is my media organized? Your media doesn't need to be immaculately organized to use XBMC, but it does need to be somewhat orderly. First, your music needs to be properly tagged. Like most other music organization software, XBMC uses ID3 tags to let you search through your music by its artist, album, or genre. If your music doesn't have ID3 tags, you'll lose out on a lot of functionality. If you purchased, downloaded, or ripped an MP3 in the last few years, it's almost certainly got ID3 tags, but some older files might be missing them. If that's the case, check out our article on using MediaMonkey to automatically add tags to your library at http://bit.ly/cr84JK.

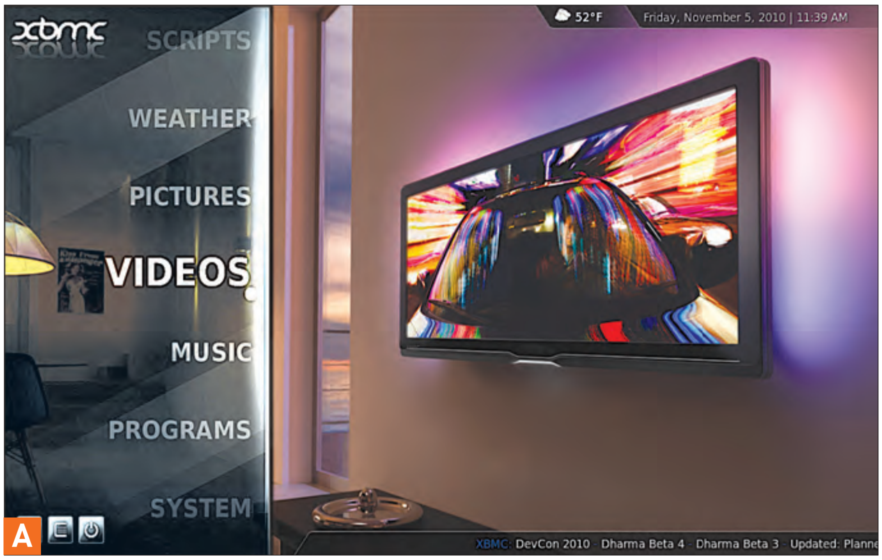


Your video library doesn't need any sort of tags, as XBMC uses "scrapers" to retrieve that data automatically from online databases. All the same, it'll make your life a whole lot easier down the line if your videos aren't spread out willy-nilly all over your hard drives. The best thing you can do is put all your movies in a single folder, and all your TV shows in another, with sub-folders for individual series/seasons (image B).

2 INSTALLING THE SOFTWARE

XBMC takes some work to get set up, but the software installation itself is dead simple. Just download the latest Windows installer at http://xbmc.org/download and run it. You get some options about what components to install, but the defaults will be fine for now—you can change anything you need to later on. You'll also be asked where you want XBMC to save its data and plugins (image C). If you choose to store them in XBMC's program folder, you'll have to choose to run XBMC with administrator rights, but it will be easier to copy your XBMC install to a different computer, plugins intact.

When the installation's done, fire up XBMC.



F

3 ADDING MEDIA

Your freshly installed XBMC is already looking snazzy, with a high-res skin and a slick user interface (image D), but right now it's sorely lacking in functionality. That's because, so far, XBMC has no idea where your media files are. You can fix this problem by selecting one of XBMC's libraries (the possible libraries are Videos, Music, Pictures, and Programs) and then selecting Add Source (image E). We chose the Video library in this example.

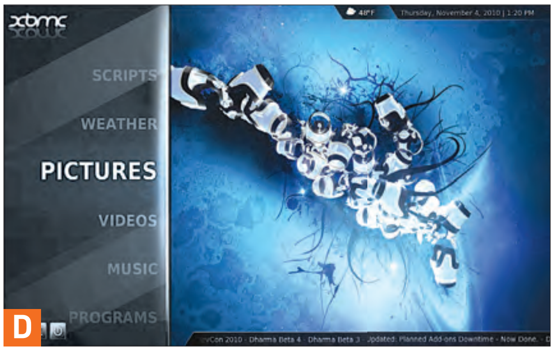
As you might guess, the Add Source dialogue lets you specify a new source for media files—this can be a drive, a folder, a network location, or a combination of the three. If it's a drive or a folder, you can either type the full path into the list, or click the Browse button and select the location. To add a network location (a NAS box, for instance) you just click Browse, then select "Add network location…" from the list. An alternative is to mount the network location as a drive on your system, then add the source that way.

A single source can draw from multiple locations, so it's best to have one source for each "category" of media. For instance, we named our first source "Movies" and it contains (surprise!) all our movies. Once you've selected all the drive locations for your source, make sure that you've given it a name, and click on the Set Content button at the bottom of the window.

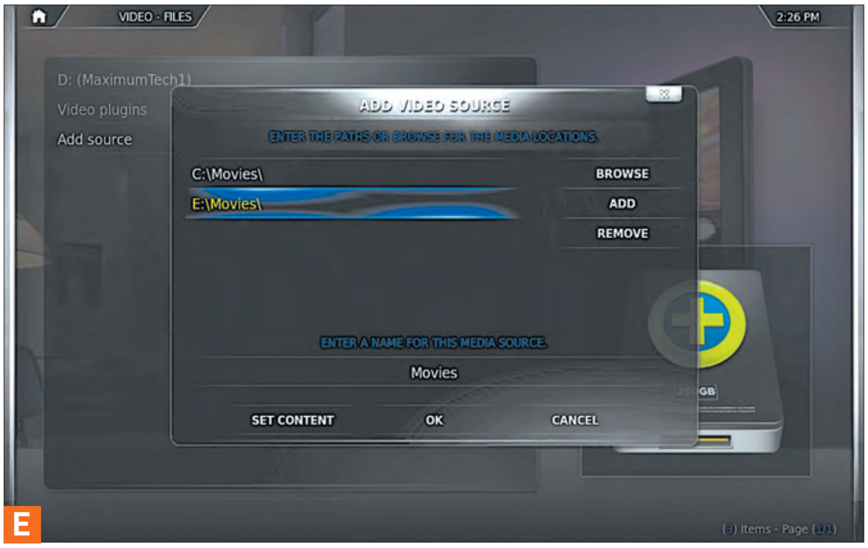
The Set Content menu is exclusive to Video sources, and lets you tell XBMC what *kind* of videos your video source contains (image F). There are three options, with slightly different behaviors:

Movie A Movie source assumes that each video file is a single movie. If your movies are in folders (with subtitle files, for instance) you'll need to check the option that says "Use folder names for lookups." If you've got lots of nested folders with movies inside, you'll need to check the option labeled "Scan recursively."

TV Show A TV source assumes that video files will be arranged in folders by series.



D



E

G

Unlike a Movie source, TV sources are recursive by default.

Music Video A Music Video source assumes each file is a single music video. The primary difference with Music Videos is that you can enable Party mode, which tells XBMC to play files from Music Video sources at random.

Whichever type of source you select will also determine which scraper will be used to identify your videos. You can select from a large list of possible scrapers, but for most purposes the default is the best choice. Once you've added a video source, select that source and press the context key (C on the keyboard, by default) and select Scan for New Content. If everything is set up correctly, XBMC will find and download data for your files.

Adding music is a bit easier, since there's no Set Content or scraper to deal with. Once you've added all the sources that you need, you can start using XBMC. Select the library you want to view with the up and down arrow keys, then press the right-arrow key, and select Library. You can now navigate through your entire video library—movies, TV shows, and music videos. If you want to change the view mode, just press the left-arrow key to access a small menu of view options (image G).

4 EXPANDING XBMC

By now, after (hopefully) only a half-hour or so of configuration, XBMC is ready to go as a media front end. You can use it to browse and watch your local media in style, but you've still only scratched the surface of what XBMC can do.

One of the main strengths of XBMC, and a compelling reason to pick it over the also-excellent Windows Media Center, is its broad range of available scripts, skins, and plugins. We'll show you how to use each to customize and expand your XBMC installation.

Skins

We'll start with the simplest add-ons—skins. Skins simply change the physical appearance (and sometimes layout) of XBMC. To find new skins for XBMC, check out the official XBMC skins page at http://xbmc.org/skins or in the official forums at http://bit.ly/doUmOd.

To install a skin that you've downloaded, you'll need to go to XBMC's application data folder. If you chose the default option during install, this will be in C:\Users*username*\AppData\Roaming\XBMC\. If you chose the portable option, the data folder will be in XBMC's program directory. Open the Skins folder, create a folder for the skin you just downloaded, and drop the contents of the skin download into it. That's pretty much it—you can find the Skin options in the Settings menu under Appearance (image H). Try out skins until you find one you like.

Plugins

A plugin is an add-on that extends the functionality of XBMC without adding any fundamentally new features. A common form of plugin is one that hooks into an online video or audio source and lets you browse through its content in XBMC. XBMC comes with a built-in package manager called the SVN Repo installer, which allows you to download and install plugins automatically. It's a little clunky, and there's a better, community-made package manager called the XBMC Zone Installer available, so our first step is to get that.

Go to XBMC Zone (www.xbmczone.com) and download and unzip the XBMC Zone Installer. Installation works about the same as a skin—go to the application data directory, then open the directory called Plugins. Inside, you'll see one folder for each library in XMBC (Videos, Music,

H

Programs, etc.). A plugin has to go into one of the main categories—the default installer is in Programs, so we'll go ahead and put XBMC Zone Installer there. Like a skin, simply drag all the unzipped plugin data into its own folder within the Programs folder.

Now, restart XBMC, and you'll find your new plugin by navigating down to Programs, then selecting Plugins. Starting a plugin like the XBMC Zone isn't really like starting a new program, but rather like opening a new folder in XBMC. This is what separates plugins from scripts—scripts add new functionality, whereas plugins merely add new "locations" to XBMC. As an example, open the XBMC Zone Installer, then find and install the GameTrailers plugin (image I). Now, if you go to your Videos library, and select the GameTrailers plugin, you can navigate through the GameTrailers streaming videos as though they were all on your hard drive.

One final word about plugins: For various reasons, many online content providers don't like third-party programs scraping their content. We won't wade into that particular debate here, but the practical upshot is that plugins (especially for major providers like TV networks) break frequently. If you install a plugin and it doesn't work, do a quick Google search for the name of the plugin. There's a good chance it might be out of order for the time being.

I

J

Scripts

Finally, we'll get to the really meaty part of XBMC customization: scripts. Scripts are add-ons that add new functionality to XBMC in a more dramatic way than plugins. There are a lot of scripts available, and some require a bit more setting up than the plugins we've seen so far. Here are two of our favorites:

▶ **ROM Collection Browser** Besides tons of media, a common thing to find on a nerd's NAS box is a classic game emulator and tons of ROMs. As with media, there are front ends that allow you to organize all your emulators and ROMs, but then you have to run two separate front ends on your HTPC. Fortunately, there's a script available for XBMC called ROM Collection Browser that adds a full-featured ROM browser and launcher to XBMC, allowing you to surf through and enjoy your games the same way you do movies and music (image J).

To install it, hit the project's home page at http://bit.ly/9M0R9i and download the script files. Unzip them into a folder in XBMC's scripts directory, just like with skins and plugins. Unlike a plugin, the ROM Collection Browser script needs some configuration to work, and it's not exactly user-friendly.

Configuring ROM Collection Browser is done by editing the config.xml file located in the plugin's resources/databases folder (image K). The config.xml file describes what your ROM library looks like to the script, allowing it to optimally catalogue your games. Fully describing the customization process would be a whole article of its own, but here's the gist:

The first half of the config file describes general options for the script. For the most part, these can be left alone. In the second part of the file, each emulator you want to use is fully described, including information such as where the emulator is located, where the ROMs are located, and what information should be displayed while browsing the ROMs. It's a bit daunting to look at at first, but every XML field is documented in the comments (the lines in the file preceded by a "<! –"), so if you read them carefully and pay close attention to the example emulator setups, you should be all right.

```
<RomCollection>
    <name>Amiga</name>
    <consoleName>Amiga</consoleName>
    <emulatorCmd>E:\Emulatoren\WINUAE\winuae.exe {-%I% "%ROM%"}</emulatorCmd>
    <useEmuSolo>True</useEmuSolo>
    <descFilePerGame>True</descFilePerGame>
    <descriptionParserFile>PathToData\Amiga\parserConfig.xml</descriptionParserFile>
    <searchGameByCRC>False</searchGameByCRC>
    <ignoreGameWithoutDesc>False</ignoreGameWithoutDesc>
    <romPath>PathToData\Amiga\roms\*.adf</romPath>
    <descFilePath>PathToData\Amiga\synopsis\%GAME%\synopsis.txt</descFilePath>
    <mediaPath type="cover">PathToData\Amiga\cover\%GAME%\*.jpg</mediaPath>
    <mediaPath type="action">PathToData\Amiga\screens\%GAME%\*.jpg</mediaPath>
    <fileTypeForGameList>cover</fileTypeForGameList>
    <fileTypeForGameListSelected>cover</fileTypeForGameListSelected>
    <fileTypeForMainViewGameInfoBig>action</fileTypeForMainViewGameInfoBig>
    <fileTypeForGameInfoViewBackground>cover</fileTypeForGameInfoViewBackground>
    <fileTypeForGameInfoViewGamelist>cover</fileTypeForGameInfoViewGamelist>
    <fileTypeForGameInfoView2>action</fileTypeForGameInfoView2>
    <fileTypeForGameInfoView3>cover</fileTypeForGameInfoView3>
Collection>
```
K

For more information on configuring this script (and a functioning test setup) see the official documentation at http://bit.ly/ayHdUK.

▶ **Grooveshark** Another excellent example of what a script can do for XBMC is the Grooveshark add-on. This script allows you to access and surf the massive music library of the Grooveshark service (How is it so massive? Are they going to get sued? Nobody knows!) from within XBMC (image L). And unlike a simple plugin, the Grooveshark script allows you to log in with your Grooveshark username and password, so you can access and make changes to your playlists and favorites from within XBMC.

Unlike ROM Collection Browser, Grooveshark is pretty easy to get up and running. Just install the script (either through the package manager, or by downloading it from http://bit.ly/bSP9Mp), and run it in XBMC in the scripts menu. You'll be asked for your login information, and then you're good to go!

In this article we've only barely touched on all of the different ways you can customize and extend XBMC. If you want to find out more about all the options available, check out the official community forums at http://forum.xbmc.org.

L

LENGTH OF TIME
4 HOURS

LEVEL OF DIFFICULTY
INTERMEDIATE

BUILD IT

A Windows Home Server with Muscle

The next generation of Windows Home Server enables video streaming and transcoding operations, so we built a WHS system that can handle the load

LOYD CASE
CONTRIBUTING WRITER

THE MISSION If you buy a Windows Home Server system off the shelf, you typically get an anemic processor—usually an Atom of some kind—and the original version of WHS, updated with various power packs. Recently, Microsoft released a beta of its next-generation Windows Home Server, code-named Vail. This new version offers some pretty cool features, which we'll dig into shortly, but it looks like you'll want something beefier than an Atom to take full advantage of them. My aim here was to build a system that will get the most out of Vail.

An adequate CPU is just part of the story. I also needed adequate memory—most off-the-shelf WHS systems tend to skimp on RAM. The system also needed to be small enough to fit into tight spaces, but large enough for all the gear I want to cram into it. I also wanted to build a system that had room for future growth—particularly storage. Mind you, I'm not skimping on storage in this initial build. But I wanted to have power and free bays for expansion.

Let's dive in and take a look at the component list.

INGREDIENTS

✔ **Case** Lian-Li PC-Q08 Mini-Q http://lian-li.com	$110
✔ **PSU** Seasonic SS-460FL Fanless 460W www.seasonic.com	$160
✔ **Mobo** Zotac H55ITX-A-E www.zotacusa.com	$130
✔ **CPU** Intel Core i3-530 www.intel.com	$114
✔ **Cooler** Intel OEM www.intel.com	$0
✔ **RAM** Crucial 2 x 1GB DDR3-1333 www.crucial.com	$45
✔ **Drives** 2 x 2TB WDWD20EADS www.wdc.com	$240
✔ **OS** Windows Home Server "Vail" Preview Build www.microsoft.com	$0
Total	$799

Choosing the Hardware

I wanted to get more performance out of this Windows Home Server build than I'd get out of an off-the-shelf system, without breaking the bank. In the end, the total cost of components, including a beefy (but noise-free) power supply and four terabytes of storage came in at just under $800.

The dual-core Intel Core i3-530 runs at 2.93GHz, and should handle my transcoding chores just fine. However, I hedged my bets, choosing the mini-ITX Zotac H55 motherboard—which has an available PCI-E x16 slot. So, if I decide I need more transcoding horsepower, and find an application that supports GPU-accelerated transcoding, I can add a GPU just for that purpose later. I also like that the Zotac board has six SATA ports—most mini-ITX boards have only four.

Any home server handling lots of media needs plenty of storage, and Western Digital's 2TB GreenPower drives deliver that in spades. These are the newer, three-platter versions that cut down a bit on power consumption and deliver improved throughput.

Another desirable item is a fanless power supply, and the Seasonic is certainly that. It's true that 460W seems like overkill for a home server, but the 400W sibling to the 460W unit couldn't be found. If a GPU or additional hard drives are added in the future, the 460W unit will look like a smart choice.

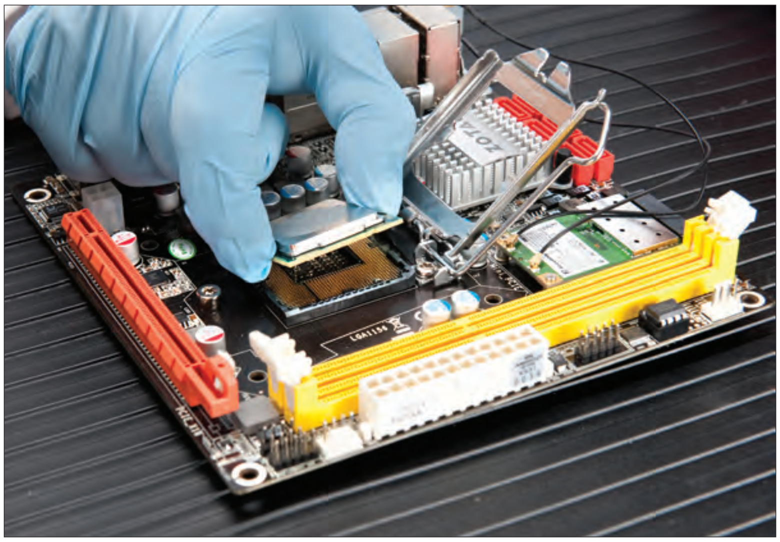
Finally, the case needed room for expansion. The Lian-Li PC-Q08 mini-ITX chassis has room for six hard drives—though the two-drive bay may need to be removed if a GPU is installed. I'd also want to pull out the Lian-Li 14cm fan, with its annoying blue LED, and drop in something a little quieter, without the glow.

Building the System

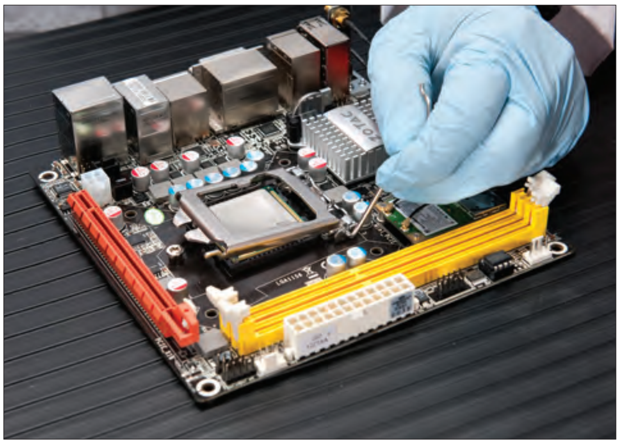
As with any small form factor system, it's important to consider the order components are installed. The good news is that the Lian-Li case is a tad larger than most mini-ITX cases. No knuckles were skinned or blood shed during the building of this particular system—that's not always the case when building a tiny PC!

For this particular system, I installed the CPU, memory, and CPU cooler prior to popping the motherboard into the case. One of the minor annoyances with aluminum cases is that they flex—that made inserting the ATX I/O shield something of a chore. Attaching the internal wiring—front-panel and USB ports—was fairly simple (including front-panel audio, though it's not really needed for a server.)

After the motherboard is installed, the next step is to attach the component cables. The Seasonic PSU is completely modular, so it was easy to attach the main (24-pin) power supply cable and the 4-pin ATX12V connector to the mobo before the power supply. I also attached the two SATA cables that would route to the pair of 2TB hard drives.



Make sure to line up the notches on the side of the CPU with the tabs in the CPU socket before you drop it in place.



Double-check to ensure the CPU is completely flat in the socket before closing the ZIF lever. Also make sure the latching notch slides under the bolt.

NEVER BUILT A PC BEFORE?

Your case, motherboard, and cooler all come with useful instructions, but be sure to check out our most recent step-by-step guide at http://bit.ly/bldcreed.

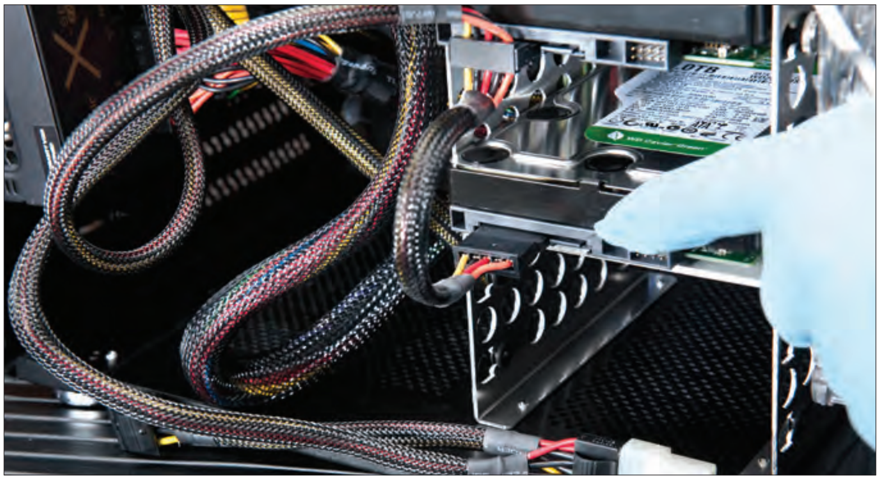
Route all cables before you slide in the PSU, including SATA cables (shown here) and the 4-pin ATX12V CPU power connector.

The PC-Q08 chassis includes a pair of removable hard drive bays—one supports four drives, the other, two. The pair of Western Digital drives slid nicely into the four-drive bay, with space between them for airflow. The two-drive bay was left empty, in case I want to remove it later to install a GPU. Note that some entry-level GPUs, like Nvidia's GTX 430 or AMD's HD 5450, would likely still fit with the two-drive bay in place, but anything longer means removing that bay.

Once the drives were installed, the remaining cables were attached. The SATA data and power cables routed to the hard drives, and the two power supply cables to the PSU. Then the PSU slides in. Note that the PSU is something of a tight fit, mainly due to cable bulk, so I gently bent the PSU cables as much as possible.

One change I'd make is to switch out the default 14cm front case fan with something a little quieter, possibly a Yate Loon low-speed fan. That would also eliminate the blue LED built into the default fan, which is a good thing in my book.

Next up is installing Windows Home Server—which means temporarily attaching a keyboard, mouse, and monitor, though the system will mainly run in headless mode once we get Vail up and running.



The only cables external to the motherboard you need are hard drive power and front-fan power.

Our hard drives are mounted to maximize airflow.

Setting Up Windows Home Server 'Vail'

Obtaining the Vail beta is straightforward if you're already a Windows Connect user (http://connect.microsoft.com/WindowsHomeServer). Otherwise, you'll need to sign up for an account.

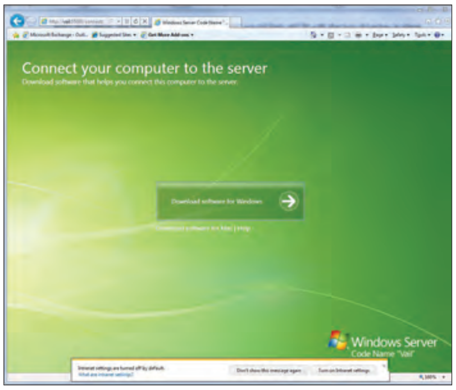
The beta is in the form of a downloadable ISO, so you'll need to burn a DVD from the ISO, or install it onto a USB flash memory drive using the Microsoft Windows 7 DVD-to-USB tool (http://store.microsoft.com/help/iso-tool). Since no optical drive is included in this build, setup was run from an 8GB USB flash memory stick.

The base installation proceeded without incident, but when the system rebooted to the WHS desktop to download updates, a weird problem cropped up. Vail had no built-in drivers for the Intel gigabit Ethernet hardware. It did recognize the Atheros Wi-Fi adapter, but couldn't log into my home network since security is enabled.

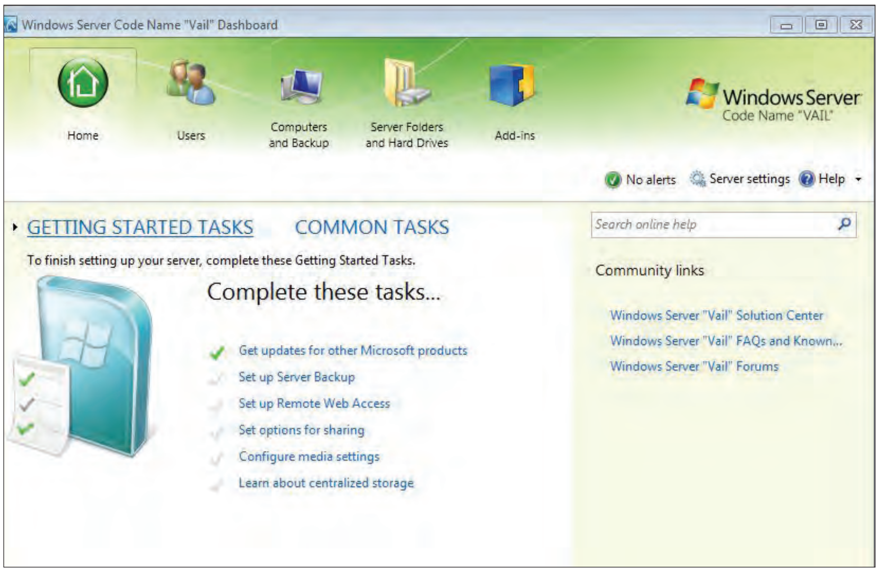
Instead of either prompting me for a password (for Wi-Fi) or prompting me for a drive (for the gigabit port), the system would pop up a screen that told me no network connection was available. The only option was "Reboot." If you reboot, you'll get the same result—in other words, it's an infinite loop! Obviously, this is a bug—but hey, it's beta software, right?

The way around this bug is to hit Ctrl-Alt-Del while the system is looking for a network (but before the "network not found" dialog pops up). Bring up task manager, kill the process that's looking for updates, and then manually install the driver.

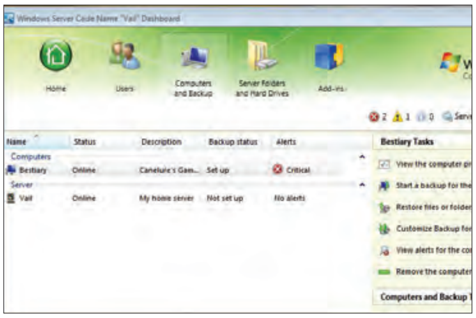
Installing the Connector software for an individual user is easier than in the original release of WHS. You no longer need to copy the app to a CD or USB key, or manually navigate to the server to download



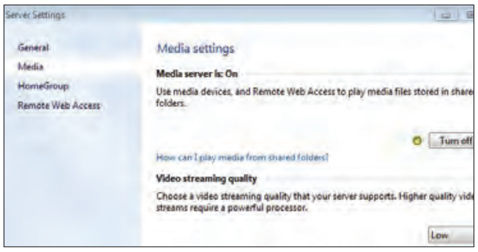
You no longer have to install the WHS Connector from CD or USB key. It's just a URL to the server for download.



The Vail Dashboard is more user-friendly, and actually has useful built-in help and walk-throughs.



You'll want to configure automatic backups once you've got all your systems set up.



It's easy to configure the new media server capabilities, including transcoding-quality settings.

it. Instead, you pop up your browser and type http://*server name*/connect, where the server name is the name you gave the server during setup. Then you can download WHS Connector and install it on the target system. Note that a version of Connector is downloadable for Mac OS X as well as Windows.

If you have your PC set to automatically log in when you start up Windows, the WHS Connector install will want you to disable that feature. Until WHS is up and running, and all passwords are consistently set, you'll need to manually log in. Since this is a home server, not a business server, you'll want your system login and your WHS account login to be the same. Once the logins and passwords are created and are the same, you can re-enable auto-login on your PC.

The Vail dashboard resembles the old WHS dashboard, but offers more user-friendly help. You'll want to create logins for other users on the network. The backup wizard steps you through the process of setting up backups for all the users, as well.

You can also more easily configure backups of the server than in the original WHS—after all, if the server goes down, you'll lose your backups, so having a backup of the server is pretty important.

Vail also offers a built-in media server, which is fully DLNA-compliant. If you plan on streaming media from the server, you'll want to configure the media server.

Once you've got users and the server itself configured, you're ready to go.

VAIL'S LANDSCAPE

About Features and Add-ins

Unlike the first WHS, Vail now natively understands Windows 7, including Win7 homegroups. Note that Vail is 64-bit only, so systems running it will need a native 64-bit processor. This means that some Atom-based systems (Atom N2xx, Atom Z500, and Z600) will not run Vail. This also means that upgrading from the current WHS to Vail will be difficult. Even if the CPU is 64-bit capable, the current Windows Home Server is 32-bit with PAE support. So, if you plan on migrating an existing Windows Home Server installation to Vail, you'll want to back up your data, then reformat your hard drives before installing Vail.

Vail has the familiar Windows Home Server Dashboard. However, there's also a new Launchpad. The Launchpad allows an individual user to access shared folders, configure, or launch a backup.

The media server built into Vail surpasses the original WHS, and reduces the need for a third-party media server add-in, like Twonkymedia. Given its full DLNA support, you can even connect from DLNA-equipped consumer electronics devices and game consoles. Note that the transcoding support currently doesn't work with Windows XP Media Center Edition 2005.

The new WHS is built on top of the Windows Advanced Server 2008 core. The WHS dev forum is full of messages regarding various add-ins that don't work or have limited functionality. (Remember, this is beta software!) If you're running WHS with either free or commercial add-ins, consider your migration carefully. Current-gen WHS add-ins won't work with Vail. However, companies are busy developing add-ins, such as Awieco's WakeOnLan (www.awieco.com/Products/WakeOnLan). If you're dependent on an add-in you're currently using (for, say, home automation), you'll want to make sure it's Vail-ready before making the switch.

Remote access is now more robust, and will even support streaming media to remote devices. So you can show off your home movies and photos of the family while you're on the road. As with the original WHS, you can also log in remotely and perform system management chores.

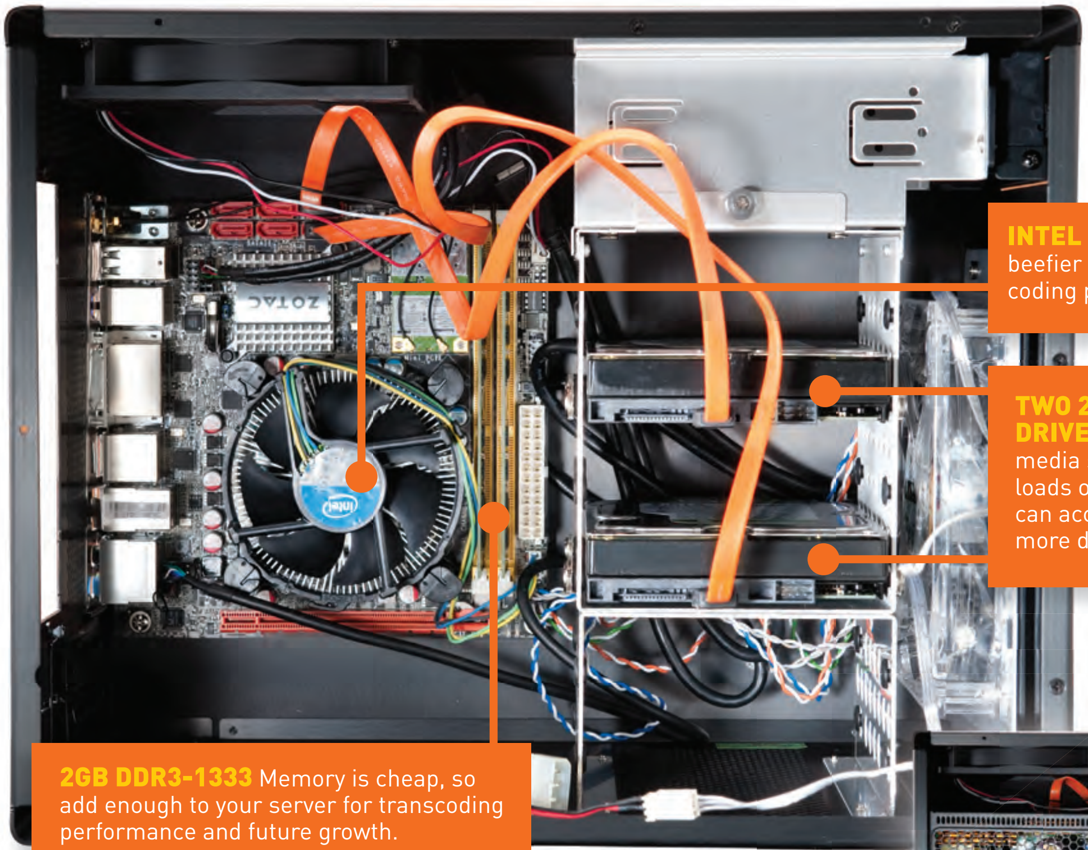
The Wrap-Up

The first generation of Windows Home Server offered functionality that wasn't much better than existing NAS (network-attached storage) boxes. You could build a better server, however, given the vast array of add-ins that arrived on the market after WHS shipped.

Vail looks to be more of a true server out of the box. The built-in media server is now DLNA-compliant, and can transcode digital media files on the fly. Vail will also be a true 64-bit server, which means that most add-ins will need to be updated to work with the new OS. But it's also likely we'll see newer and more robust add-ins, particularly for home automation.

Even given Vail's higher level of sophistication and added features, it's easy to set up and easy to manage. We've no doubt that the next-generation Windows Home Server will do well in the market. But if you plan on using your home server for anything more than just a repository for files, you should think about building or buying a system with a stronger CPU and the option of adding a GPU later, as I did with this build. You'll be able to take full advantage of Vail's new features and the wealth of add-ins that will become available.

Our Vail system has a small footprint, but lots of expandability.



SUMBIT YOUR IDEA Have an awesome idea for Build It? Let us know at comments@maximumpc.com.

REVIEWS

Tested. Reviewed. Verdictized.

INSIDE

74 CYBERPOWER LAN PARTY EVO MINI

75 ASUS G73JW-A1 NOTEBOOK

76 SAMSUNG N230 NETBOOK

78 GIGABYTE GA-X58-USB3 MOTHERBOARD

80 AMD RADEON HD 6800 SERIES: XFX RADEON HD 6850, XFX RADEON HD 6870

82 3TB WESTERN DIGITAL CAVIAR GREEN HARD DRIVE

84 LOGITECH REVUE GOOGLE TV BOX

86 LITE-ON iHBS212 BLU-RAY BURNER

88 ROCKETFISH 2.4GHZ INDOOR/OUTDOOR SPEAKER

89 GATEWAY FHX2402L MONITOR

90 RAZER LACHESIS 5,600DPI GAMING MOUSE

91 FALLOUT: NEW VEGAS

ONLINE

- EVEN MORE REVIEWS!
- BEST OF THE BEST
- BREAKING TECH NEWS
- NO BS PODCAST

CyberPower LAN Party EVO Mini

Can a dual-core take on a quad-core? Yes, it can

Do great minds think alike, or is Silverstone's SG07 chassis just that cool? We suspect the SG07 is just that cool. After all, the chassis that CyberPower used for its LAN Party EVO Mini happens to be the same chassis we used for our "Wee Ass-Kicking Machine" (Build It, December).

As with the WAKM, the SG07 limits you to a single PCI-E slot and a Mini-ITX board, but that doesn't mean the CyberPower and WAKM are the same. In fact, they couldn't be more different.

The LAN Party EVO Mini features AMD's new Radeon HD 6870 card, while the WAKM used a Gigabyte 1GB GeForce GTX 460 card. The WAKM used a Zotac board with integrated Wi-Fi, while CyberPower reaches for a Gigabyte GA-H55N-USB3 board.

The real drama here is CPU choice. Both mini rigs use Intel chips, but while the WAKM used the awesome 2.93GHz Core i7-870 quad-core, CyberPower opts for a Core i5-655K. The K denotes that the chip is unlocked to aid overclocking, and CyberPower takes advantage of that by pushing the chip up to 4.32GHz. For the 655K, which has been publicly overclocked to 5GHz, it's no stretch. We didn't overclock the proc in our own mini because the stock LGA1156 cooler isn't the greatest for that purpose. CyberPower overcomes its rig's thermal limitations by somehow stuffing an Asetek 550LC into the tiny chassis.

Despite the overclock, we were pretty confident that the Wee Ass-Kicking Machine would prevail. With its 120GB SSD and quad-core, surely the LAN Party EVO Mini would get dusted, right? Wrongness.

While the LAN Party EVO Mini is second place in three of our benchmarks, it actually managed to beat the Wee Ass-Kicking Machine in two benchmarks and tie it in another. A quick glance at our benchmark chart will tell you what happened: In the multithreaded apps where more cores matter, the LAN Party EVO Mini loses by 16 to 17 percent. The three apps where it wins or ties don't exploit the extra two cores in the WAKM, which gives the higher clocks in the LAN Party EVO Mini the advantage. In the gaming benchmarks, the CyberPower loses in STALKER, but its clock advantage pushes it up over the top in Far Cry 2. For the most part, it's a benchmark draw.

Mind you, we run our standard desktop benchmarks at 2560x1600 to stress super-gaming machines. On single-GPU, sub-$1,500 boxes, it's not the best representation of the resolution at which most people will play. In other words, at 1920x1080, both machines would run just about anything you could throw at them today.

In the end, the CyberPower LAN Party Mini EVO is a sweet, compact little rig. It's also pretty palatable at $1,250—a nice discount over our WAKM, which tilted the scale to $1,653. So, it's cheaper, just about even in performance, and it's even water-cooled. In our book, that's a win. —GORDON MAH UNG

Stuffed somewhere in the Silverstone Chassis is a water-cooling system.

SPECIFICATIONS

Processor	Intel 3.2GHz Core i5-655K
Mobo	Gigabyte GA-H55N-USB3
RAM	4GB Kingston DDR3/1800
Videocard	AMD Radeon 6870 1GB
Soundcard	Onboard
Storage	2TB Hitachi 7K2000
Optical	Optiarc AD-7560S
Case/PSU	Silverstone SG07 / Silverstone 600-watt PSU

BENCHMARKS

	ZERO POINT	
Vega Pro 9 (sec)	4,028	4,770 (-16%)
Lightroom 2.6 (sec)	428	400
ProShow 4 (sec)	1,418	1,433 (-1%)
Reference 1.6 (sec)	2,703	3,109 (-13%)
STALKER: CoP (fps)	26.5	22.9 (-14%)
Far Cry 2 (fps)	64.4	75.6

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current small form factor test bed consists of a quad-core 2.93GHz Core i7-870, 4GB of Corsair DDR3/1333 RAM on a Zotac H55ITX-A-E board. We're running a Gigabyte GTX N460OC-1G1 graphics card, 120GB Corsair Force F120 SSD, and the 64-bit version of Windows 7 Home Premium.

VERDICT 9

CYBERPOWER LAN PARTY MINI EVO

+ GARY COLEMAN	− GARY GLITTER
Fast, small, and water-cooled.	Will lag in apps optimized for quad-cores or greater.

$1,250, www.cyberpowerpc.com

Asus G73Jw-A1

Featuring Nvidia's new GeForce GTX 460M graphics

A 17-inch notebook is going to be big, there's just no way around it. But after reviewing Malibal's ginormous X7200 desktop replacement in our Holiday issue, Asus's eight-pound, 11.8-ounce G73Jw-A1 seems highly portable by comparison. And at $1,800—one-third the price of the X7200—the G73Jw-A1 also seems highly affordable.

You get a lot of notebook for that price. At its center is a Core i7-740 quad-core mobile CPU, with a base clock of 1.73GHz and Turbo Boost potential up to 2.93GHz. Asus kicks that up a notch with a one-button overclock feature called Twin Turbo Mode, which pushes the CPU as much as 100MHz higher. According to Asus, Twin Turbo's impact is most noticeable in multithreaded apps. And we did see a 6 percent difference when running MainConcept with and without Twin Turbo. But we also observed a similar difference in scores when we ran Photoshop, a mostly single-threaded app, both ways. Hey, we'll take any extra performance we can get.

When the G73Jw-A1 is closed, you can see how the matte black finish and a few strategically designed edges and angles remind us of a stealth fighter.

Running all of our benchmarks with the help of Twin Turbo, the G73Jw-A1 enjoyed generous leads over our zero-point notebook in all the content-creation apps. It also surpassed our zero-point in the gaming benchmarks; although, here the more relevant factor was the notebook's Nvidia GeForce GTX 460M GPU—a new Fermi-based mobile part. While this card turned out superior scores to the GeForce GTX 260M in our zero-point rig, the benchmark numbers in Far Cry 2 and Call of Duty 4 were pretty close to what we've seen from the last-gen GeForce GTX 285M. The big difference is that the G73Jw-A1's GPU supports DX11. Based on the frame rates we achieved in our aged games, you'll need to dial down resolutions and effects to make newer games playable—a common compromise in gaming notebooks, particularly those with just a single graphics card.

The G73Jw-A1 comes equipped for HD movie viewing, as well, with a 17.3-inch LED backlit screen that supports a 1920x1080 resolution, perfect for playing Blu-ray movies on the notebook's combo drive. The G73Jw-A1 also has a decent sound system. It doesn't compare to the audio quality you'll get from an external set of speakers or a good set of headphones, but the presence of a subwoofer gives the G73Jw-A1 a much richer sound than you typically get from laptop speakers, and the volume gets pretty loud.

Physically, the G73Jw-A1 is solid. Its matte finish mitigates unsightly fingerprints and its rubberized palm rest area feels pleasant. We also like the full-size chiclet-style keyboard, which is backlit for greater visibility in dark environments. And folks who want to get under the hood will appreciate that a single access panel and two screws are the only things standing between you and three RAM slots, both drive bays, and the wireless card.

While we gave the Malibal X7200 high marks for its audacity, Asus's G73Jw-A1 deserves praise for being a strong performer in a far more practical, portable, and affordable package. —KATHERINE STEVENSON

SPECIFICATIONS

CPU	1.73GHz Intel Core i7-740QM
RAM	8GB DDR3/1066MHz
Chipset	Intel HM55
Drives	Two Seagate Momentus 500GB 7,200rpm drives
Optical	BD ROM / DVD+/-RW combo drive
GPU	Nvidia GeForce GTX 460M
Ports	HDMI, VGA, Ethernet, one USB 3.0, three USB 2.0, mic in, S/PDIF out, 8-in-one media reader, webcam, Bluetooth, 802.11g
Lap/Carry	8 lbs, 11.8 oz / 10 lbs, 11.4 oz

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	1,320	899
Photoshop CS3 (sec)	153	131
Proshow Producer (sec)	1,524	876
MainConcept (sec)	2,695	1,782
Far Cry (fps)	32.7	48.5
Call of Duty 4 (fps)	58.2	62.2
Battery Life (min)	100	96 (-4.0%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066, a 500GB Seagate hard drive, a GeForce GTX 260M, and 64-bit Windows 7 Professional. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty 4 tested at 1680x1050 with 4x AA and 4x anisotropic filtering.

VERDICT 9

ASUS G73JW-A1

+ MELODIOUS
Quad-core i7; DX11 graphics; decent sound system; HD screen.

– MALODOROUS
You'll need to dial down detail to play newer games.

$1,800, www.asus.com

Samsung N230 Netbook

It's thin and sleek—too bad it's an Atom netbook

We didn't want to admit it, but it's true: The Atom netbook market is a snooze. Netbooks based on Intel's Atom platform (currently in its Pine Trail incarnation) ship with a 10.1-inch screen, 1GB of RAM, a 1.6GHz single-core Atom processor, Windows 7 Starter, blah blah blah. Netbooks with Nvidia's Ion graphics architecture are more interesting, but they're few and far between. At night, faint echoes from the ventilation shafts whisper of AMD's forthcoming Atom smasher, code-named Ontario, which could signal a new dawn for the genre. But for now, the best we can hope for in this thoroughly commoditized market is a netbook that performs as well as its peers but looks good doing so. Samsung's N210, which we reviewed in July, rocked a gorgeous Space Age aesthetic and a great keyboard but was packed to the exhaust ports with bloatware. The N230 has the same hardware, but in the slimmest, sleekest frame we've ever seen on a netbook. Where the N210 was Space Age, the N230 is pure modern.

By eschewing the multilayer clear-on-white plastic shell of the N210 for a single-layer, slim black carapace, Samsung made the N230's profile sleeker—at its thickest it's still less than an inch thick, and most parts of it are three-quarters of that. It's also the lightest netbook we've ever tested, at just two pounds, five ounces (tied with the very first Acer Aspire One we tested in December 2008 for lap weight, and even lighter than that netbook when the power brick is included). Skipping the 6-cell battery did wonders for the N230's weight and lines, but with a 3-cell battery, the N230 doesn't last as long as its peers: It tapped out of our video rundown test 10 minutes short of the four-hour mark—70 minutes sooner than the N210 and nearly four-and-a-half hours short of the HP Mini 5102 (September 2010). All other benchmark scores were indistinguishable from those of any other Pine Trail netbook.

The N230's lid is glossy-black plastic, while the interior is matte black and the wrist rest is brushed metal. We wish Samsung would have taken at least a little style from the N210 and gone without the exterior's sheen, which only looks good if you handle the netbook with kid gloves, or leave it at home. Given that the whole point of a netbook is to have a fully functional real computer (as opposed to a tablet) that you can chuck into a bag and take with you, we prefer ones that don't look dirty as soon as you take them out of the box.

The island-style keyboard is just as roomy and comfortable as its predecessor's, and the multitouch trackpad, though a bit small for our tastes, is accurate and easy to use. The N230's port and connector array is standard—three USB 2.0 ports (one of which can charge electronics while the computer is sleeping), audio jacks, VGA out, 10/100 Ethernet, and a multicard reader, and it has 802.11b/g/n Wi-Fi, though no Bluetooth. With the N230, Samsung dropped its Hyperspace instant-on OS, which we can't help but applaud, along with the decision to include less bloatware. We still had to drag a bunch of desktop icons to the Recycle Bin, but they were mostly for Samsung's onboard maintenance tools, not third-party software (aside from the inevitable Norton trial).

The Samsung N230 takes the standard netbook loadout and crams it into the lightest 10-inch chassis we've ever held. Though it's a magnet for fingerprints, it has great lines, and at around $350, it's a pretty good deal. The N230 manages to impress us despite our netbook ennui. That's not a lot, but we'll take it. **–NATHAN EDWARDS**

SPECIFICATIONS

Processor	1.66GHz Intel Atom N450
Chipset	Intel NM10 Express
Graphics	Intel GMA 3150
Display	10.1-inch LED-backlit LCD@1024x600
RAM	1GB DDR2/667
Storage	250GB HDD (5,400rpm)
Ports	Three USB 2.0, audio in/out, multicard reader, VGA, 10/100
Wireless	802.11b/g/n
Lap/Carry	2 lbs, 5 oz / 2 lbs, 14.5 oz

VERDICT 8

SAMSUNG N230 NETBOOK

+ FOGHAT	**– FROGHAT**
Slimmest, lightest netbook we've tested; good keyboard.	Sub four-hour battery; boring internals; fingerprint prone.

$350, www.samsung.com

BENCHMARKS

	ZERO POINT	
Premiere Pro CS3 (sec)	708	682
MainConcept (min)	251	247
Quake 3 (fps)	60.9	56.7 (-6.9%)
Quake 4 (fps)	3.6	4.1
Battery Life (mins)	255	230 (-9.8%)

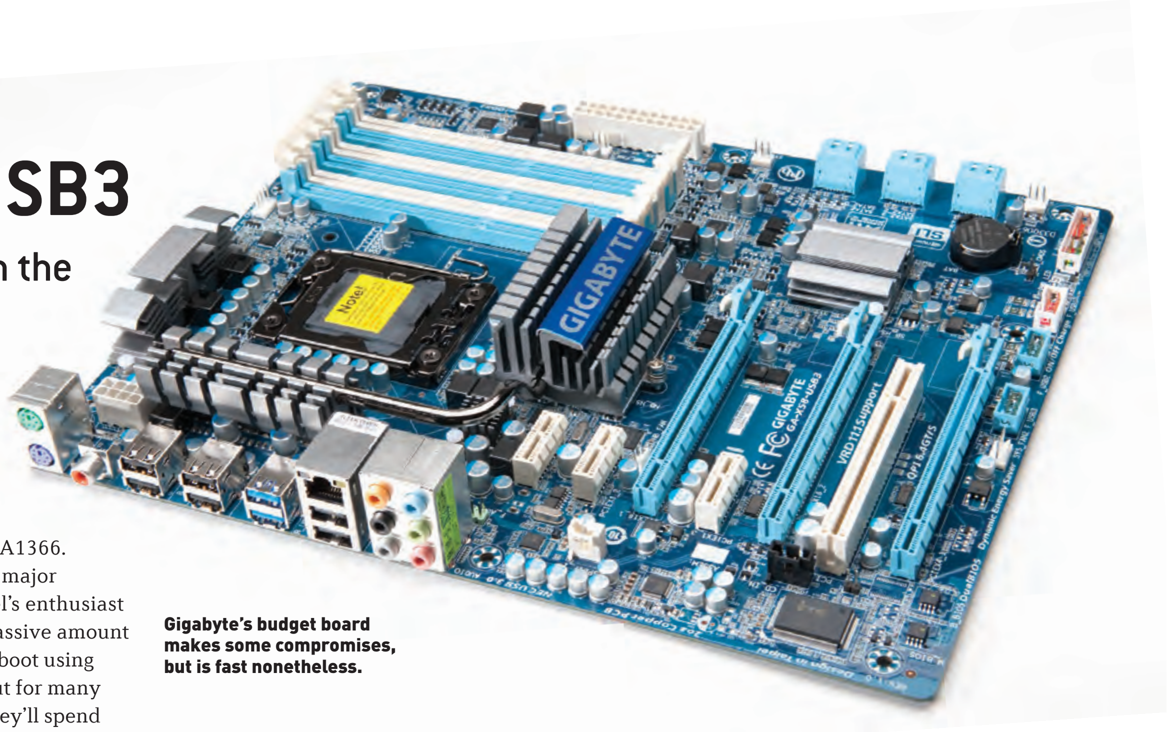
0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point netbook is a Lenovo IdeaPad S12 with a 1.6GHz Intel Atom N270, 1GB of DDR2/667 RAM, a 160GB hard drive, Intel GMA950 integrated graphics chipset, and Windows XP Home SP3.

What it lacks in power, the N230 makes up with its lightweight chassis and low price.

Gigabyte GA-X58-USB3

Puts all its eggs in the USB 3.0 basket



Gigabyte's budget board makes some compromises, but is fast nonetheless.

With both LGA1156 and AM3 scheduled for termination sooner rather than later, there's only one safe harbor that will carry you through this year: LGA1366.

Fortunately, it's no longer a major financial stretch to get into Intel's enthusiast socket. Yes, you can spend a massive amount of cash on a board that you can boot using the Bluetooth on your phone, but for many DIYers, $200 is the maximum they'll spend on a mobo. Enter Gigabyte's GA-X58-USB3. As the name implies, it's a USB 3.0 board using Intel's elderly but still quite capable X58 chipset.

Think of the GA-X58-USB3 as a way-cheaper version of the GA-X58A-UD7 board that we reviewed in the October 2010 issue. How much cheaper? With a street price of $170, it's literally half the cost of the UD7 and about $30 less than the Asus Sabertooth X58 board we reviewed in the Holiday 2010 issue. Gigabyte does that by shaving off a lot of the features from the UD7, such as the water blocks and massive heatsinks. The USB3 also steps back from the UD7's 24-phase power, the onboard power switches, and POST LED. You get the point. However, as with the Asus Sabertooth X58, the GA-X58-USB3 doesn't feel like a total strippo motherboard. There are still beefy heatsinks on the chipset and voltage regulation modules. We also like the layout of the GA-X58-USB3 board over the Sabertooth X58. With the Sabertooth X58, the sole PCI slot is covered if you insert a dual-slot GPU into the top x16 slot. With the GA-X58-USB3, you can still access the PCI slot. Only when you go CrossFire X or SLI would you lose access to the PCI slot.

Given the very maturity of the X58 chipset, we usually don't expect to see much variation in performance, and we didn't here. For the most part, the X58 boards were within the margin of error for the benchmarks, or so close it really didn't matter (hence the very limited bolding in the benchmark chart). As it has been, performance is not the main driver in selecting an X58 board. It's about features and implementation.

That's where we have a few quibbles with the GA-X58-USB3. We're not sure what's going on, but Gigabyte's Easy Tune 6 overclocking app always needs permission to launch in Windows 7. The same problem vexed us with the UD7 board. After letting the Gigabyte utility auto-update, it still needed permission to run, but then would fail to launch after the update. Fail. We recommend that you simply not install it.

As we said earlier, the GA-X58-USB3 doesn't feel like a strippo board, but upon closer examination, it actually is pretty well stripped. Missing from the board are eSATA, SATA 6Gb/s, and FireWire ports. Some of those we can live without, but can we live without all three? Not us. Particularly when $30 more gets you the Sabertooth X58, which offers the full complement of interface options.

The GA-X58-USB3 is best left to budget X58 buyers who need the better slot layout of the Gigabyte board and have no need for any ports other than USB. —GORDON MAH UNG

BENCHMARKS

	Gigabyte GA-X58-USB3	Asus Sabertooth X58	Gigabyte X58-UD7	Asus Rampage III Extreme
PCMark Vantage 64-bit Overall	8,930	8,827	8,993	8,940
Everest Ultimate Mem Read (MB/s)	14,668	14,310	14,618	14,628
Everest Ultimate Mem Write (MB/s)	12,078	11,962	12,076	12,194
Everest Ultimate Mem Copy (MB/s)	16,904	16,727	16,470	17,062
Everest Ultimate Mem Latency (ns)	60.2	60.4	59.8	60.5
SiSoft Sandra RAM Bandwidth (GB/s)	22.7	22.7	22.8	23
3DMark Vantage Overall	15,371	15,498	15,549	15,443
3DMark Vantage GPU	14,590	14,708	14,643	14,640
3DMark Vantage CPU	1,831	18,473	18,618	18,483
Valve Particle test (fps)	149	148	149	149
Resident Evil 5 low-res (fps)	125.3	128.0	130.1	126.7
HAWX low-res (fps)	170.0	175.0	175.0	174.0
HD Tune Pro Sustained Write (MB/s)	103.7	99.8	98.9	102
HD Tune Pro Burst (MB/s)	**188.8**	177.3	136.7	172

Best scores are bolded. Tests were conducted on each board using an Intel 2.8GHz Core i7-930, 6GB of Corsair DDR3/1333, an AMD Radeon HD 5850, a 1TB Western Digital Caviar Black, and 64-bit Windows 7 Professional.

VERDICT 7

GIGABYTE GA-X58-USB3

+ WOOKIE	− COOKIE
Good slot layout; beefy heatsinks; low price.	No SATA 6Gb/s, eSATA, or FireWire.

$170, www.gigabyte.com

AMD Radeon HD 6800 Series

Superlative performance at an impressively low price

AMD shipped its first DirectX 11 GPU, the Radeon HD 5870, in late 2009. Despite supporting Microsoft's latest 3D API, the new GPU's architectural foundation was based on the earlier Radeon HD 4000 series.

AMD is now launching its second-generation DX11 product, code-named Northern Islands, but these new processors are based on an architecture that's been redesigned from the ground up. The company is approaching this launch a little differently: Instead of pushing out a new, high-end product, AMD is launching two midrange GPUs—collectively code-named Bart—near the $250 mark. A high-end GPU will arrive soon, but it's clear that AMD is addressing the bread-and-butter midrange buyers first.

We expect there will be some initial confusion among consumers, since AMD's branding makes the cards look like replacements for the Radeon HD 5850 and Radeon HD 5870. They're not. With an estimated retail price of $180, the Radeon HD 6850 is actually replacing the Radeon HD 5830, while the $240 Radeon HD 6870 will supplant the Radeon HD 5850. Nvidia has dominated the market at those price points thanks to its 768MB and 1GB GeForce GTX 460 SKUs.

The 6800 series currently offers between 12 and 14 SIMD (single instruction/multiple data) blocks, with 80 stream processors per block. The Radeon HD 6870 ships with 1,120 stream processors (14 SIMD blocks), while the HD 6850 has 960 stream processors (12 SIMD blocks). Both GPUs use the same die; the 6850 simply has two blocks disabled.

The 6800 series now includes two dispatch processors, each with its own instruction and data caches (the 5800 had only one). Besides the addition of a second dispatch unit, the dispatch processor itself has been updated. The net result is improved thread management and buffering, allowing the GPU to keep more threads in flight to minimize stalling.

According to AMD, the tessellation unit has been significantly reworked, offering higher throughput. The 6800 series is built on a 40nm manufacturing process, but both the 6850 and the 6870 boast higher clock speeds than the 5850 and 5870. The 6800's tessellation unit works best when the application delivers around 16 pixels per polygon. At the extreme end, with one-pixel polygons, performance tends to trail off, though the tessellation rate still remains higher than with the 5870. At the sweet spot, tessellation performance is double that of the 5870.

The XFX 6850 features an upgraded cooling solution yet runs at stock speeds.

While we can't dive into many details here, AMD also added additional antialiasing features, particularly morphological AA, which is actually a post-processing AA technique accelerated using Microsoft's DirectCompute API. What's cool about it is that it detects all edges, not just polygon edges, so it can apply antialiasing to texture edges as well. It's also faster than supersampling. Morphological AA won't be enabled in AMD's Catalyst drivers until later this year, but because it's a post-processing feature, it will work with DirectX 9, 10, and 11 games.

AMD has also improved its Eyefinity multimonitor technology. Reference-design cards have five display connectors: two mini-DisplayPort 1.2 connections, one HDMI 1.4a, one dual-link DVI, and one single-link DVI. Third-party manufacturers, however, are free to ship different configurations.

We didn't run in-depth CrossFire benchmarks, but the performance scaling we've seen is impressive—we're talking a very close to 2x performance boost running two cards in CrossFire mode. That's considerably better than what we've seen running any two 5800-series cards. A pair of 6850s running in CrossFire will be a potent gaming configuration for just $360.

The tech industry has a difficult time keeping secrets, and that's certainly been the case for AMD this time around. Those leaks gave Nvidia the opportunity to launch a preemptive strike by lowering its prices: The GeForce GTX 460 with 1GB of memory has dropped to less than $200 (although some manufacturers are using mail-in rebates to get there), and the GTX 470 will sell for $260 (or even less, when you take mail-in rebates into account)—but both those prices are till higher than the average price of a Radeon HD 6870.

Overall, it's looking like AMD has a pair of winners on its hands. By offering greater efficiency, interesting new display features, and improved performance at attractive price points, AMD is stepping up the pressure on its main rival. The net result is faster frame rates for less money, and that's a win for PC gamers. **–LOYD CASE**

XFX RADEON HD 6850

As we said previously, the Radeon HD 6850 is based on an entirely new GPU architecture optimized for DirectX 11 games. But don't be confused by AMD's branding: The Radeon HD 6850 will replace the Radeon HD 5830, not the Radeon HD 5850, and certainly not the company's top-shelf GPU, the Radeon HD 5870.

The XFX Radeon HD 6850 reviewed here departs only slightly from AMD's reference design: There's a single full-size DisplayPort connector instead of the dual mini-DisplayPorts that AMD envisioned, and XFX's custom cooler

instead of the dual mini-DisplayPorts that AMD envisioned, and XFX's custom cooler delivers better airflow. The GPU and 1GB frame buffer on this card are clocked at the stock rates of 775MHz and 1,000MHz, respectively.

The Radeon HD 6850 is manufactured using the same 40nm process as the Radeon HD 5850, but the die size is much smaller ($255mm^2$ versus $334mm^2$). The new chip has 480 fewer stream processors and 24 fewer texture units, but its ROP count remains the same and its core clock speed is considerably higher (775MHz compared to 725MHz). In spite of this, the card consumes much less power at idle and under load, and requires just one 6-pin power connector.

In terms of performance, XFX's stock-clocked Radeon HD 6850 held up very well against overclocked Nvidia GeForce GTX 460 cards with 768MB and 1GB frame buffers, as well as an overclocked Radeon HD 5850. That makes the power-consumption numbers all the more remarkable.

But other than the redesigned heatsink and fan, that leaves XFX's excellent warranty as the only other justification for the $20 premium XFX expects to fetch over AMD's retail price guidance. Is it worth it? That's up to you.

VERDICT 8

XFX RADEON HD 6850
$200, www.xfxforce.com

The XFX 6870 gives you a ton of output options.

XFX RADEON HD 6870

It's obvious that 6870 is 1,000 better than 5870, right? Of course not. AMD's second second-gen DX11 part is *not* AMD's new top-shelf GPU. Instead, the HD 6870 is more comparable to the older HD 5850, but it's much cheaper and consumes considerably less power. It's not about fratricide with AMD though—the real targets are Nvidia's mid-priced 768MB and 1GB GeForce 460 GPUs.

XFX's take on the Radeon HD 6870 hews much closer to AMD's reference design and features a mounting bracket with two mini-DisplayPort 1.2 connectors, one HDMI 1.4a, one dual-link DVI, and one single-link DVI. XFX's core and memory clock speeds are also the same as AMD's reference design: 900MHz and 1,050MHz, respectively.

The spec chart helps explain why the Radeon HD 6870 fails to overcome the older high-end part: The new GPU has 480 fewer stream processors, 24 fewer texture units, and its 1GB of GDDR5 memory runs at a slower clock speed (1,050MHz versus 1,200MHz). The 6870's core clock speed, on the other hand, runs 50MHz faster than the older 5870 (900MHz versus 850MHz).

Despite running at reference-design clock speeds, XFX's take on the Radeon HD 6870 delivered impressive benchmarks compared to the overclocked 768MB and 1GB GeForce GTX 460 cards we tested, as well as an overclocked Radeon HD 5870. The Radeon HD 6870 boasts an exceptional price/performance ratio, with an even more impressive performance-per-watt ratio. This card is most definitely a winner.

SPECS

	Radeon HD 6850	Radeon HD 6870
Die Size (mm^2)	255	255
Transistor Count	1.7 Billion	1.7 Billion
Memory Bandwidth	4Gbps	4.2Gbps
Stream Processors	960	1,120
Texture Units	48	56
ROPs	32	32
Core Clock (MHz)	775	900
Memory Clock (MHz)	1,000	1,050
Memory	1GB GDDR5	1GB GDDR5
Power (watts idle/load)	19/127	19/151
Power Connectors	One 6-pin	Two 6-pin

MAXIMUMPC KICK ASS!

VERDICT 9

XFX RADEON HD 6870
$250, www.xfxforce.com

BENCHMARKS

	XFX Radeon HD 6850	XFX Radeon HD 6870	XFX Radeon HD 5830	Asus Radeon HD 5850	HIS Radeon HD 5870	Asus GTX 460 768MB	Gigabyte GTX 460 1GB	EVGA GTX 470
3DMark Vantage Perf	14,292	17,068	14,225	15,514	**19,282**	13,737	14,609	15,412
Unigine Heaven 2.1 (fps)	16	19	13	14	13	18	18	**24**
Crysis (fps)	24	29	21	26	**33**	19	18	14
BattleForge DX11 (fps)	36	42	30	42	45	38	37	**50**
Far Cry 2 / Action (fps)	67	65	42	53	66	56	54	**68**
Far Cry 2 / Long (fps)	68	78	47	61	78	68	66	**83**
HAWX DX10 (fps)	62	73	50	76	**92**	63	65	86
STALKER: CoP DX11 (fps)	28	34	26	30	**38**	25	30	32
Just Cause 2 (fps)	30	35	26	32	**37**	30	31	33
Aliens vs. Predator (fps)	23	27	19	25	**31**	21	22	30
Power @ idle (W)	133	129	137	142	141	**128**	131	161
Power @ full throttle (W)	**218**	254	241	290	283	248	251	353

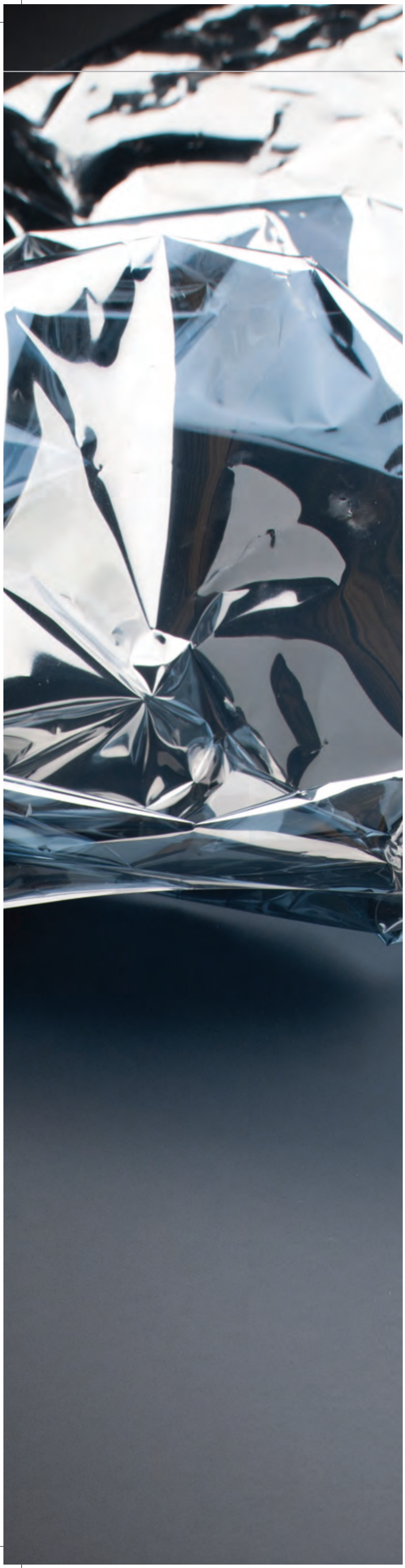
Best scores are bolded. Our test bed is a 3.33GHz Core i7-975 Extreme Edition in an Asus P6X58D Premium motherboard, with 6GB of DDR3/1333 and an 850TX Corsair PSU. The OS is 64-bit Windows 7 Ultimate. All games are run at 1920x1200 with 4x AA.

BENCHMARKS

	WD Caviar Green 3TB	WD Caviar Green 2TB	Seagate Barracuda LP 2TB
HDTune 4.01			
Avg Read (MB/s)	**96.1**	75.9	93.2
Random-Access Read (ms)	15.4	**15.0**	16.2
Avg Write (MB/s)	**92.8**	76.7	91.2
Random-Access Write (ms)	15.6	**15.1**	16.3
Burst Write (MB/s)	**200.7**	197.5	178.4
Premiere Pro Encode (sec)	449	412	**385**
PCMark Vantage	3,987	3,937	**4,394**

Best scores are bolded. All drives tested on our hard drive test bench: a stock-clocked Intel i7-930 CPU on an Asus P6X58D Premium motherboard with 6GB DDR3, running 64-bit Windows 7 Professional. All tests performed using HighPoint RocketRaid 62x HBA.

The 3TB Western Digital Caviar Green. Actual size shown here.



3TB Western Digital Caviar Green

Finally, a bootable 3TB hard drive—for select systems

It's been nearly two years since we saw the first 2TB drives hit the market. You'd think we would have gotten 3TB drives months ago. It's not that hard, is it? Turns out, it's pretty complicated. We'll get into all that in a second, but in the meantime, here's what you need to know: Western Digital's new 3TB Caviar Green drive is the first internal bootable 3TB drive to hit the market. It's not the first 3TB drive—Western Digital and Seagate both have external versions—but it is the first bootable 3TB drive.

So, why are we only now seeing bootable 3TB drives? Because most computers are running on kludged-together legacy systems, that's why! Hard drives have historically been divided into 512-bit sectors. Your drive's master boot record, which tells the BIOS where everything is on a given drive, is 32-bit, so it can only address a number of sectors equal to one 32-bit integer's worth. Two to the 32nd power is 4,294,967,296; multiply that by 512 bytes and you get 2.19TB, which is how big a partition can be before the MBR runs out of room to figure out where everything is. To overcome this obstacle, your PC needs to meet a laundry list of requirements: It needs a 64-bit OS, a motherboard that supports UEFI (the successor to the BIOS), and support for GPT partitions rather than MBR.

If your PC meets those requirements, you should be able to create a bootable 3TB partition on WD's new 3TB Caviar Green. Just to make sure, Western Digital includes an off-the-shelf HBA (host bus adapter) with a carefully vetted chipset/driver combo—HighPoint's RocketRaid 62x—which allows users to bypass their motherboard's south-bridge storage drivers. In our experience, most motherboard south-bridge drivers aren't quite ready for 3TB drives. When we tried formatting ours from the Intel ICH10R on our test bed, it showed up as an 800GB drive, and we've heard reports of similar issues from other south-bridge drivers, so WD's inclusion of an HBA with a tested driver set was wise.

We were able to create a working Windows 7 install on a 3TB GPT partition on the 3TB Caviar Green using the HBA. We benchmarked the drive on our standard motherboard test bed against the 2TB Caviar Green (reviewed May 2009) and Seagate's similarly spec'd 2TB Barracuda LP (reviewed October 2009). We tested all three drives using the RocketRaid HBA with GPT partitions. Thanks to its four 750GB platters—and phenomenal areal density—the 3TB Caviar Green was the fastest in average sequential read and write speeds, topping 92MB/s in both. However, it lagged behind the other drives in our PCMark Vantage and Premiere Pro benchmarks.

The 3TB Caviar Green is fast (inasmuch as a low-power drive can be), enormous, and—given that it ships with a useful two-port 6Gb/s SATA HBA—a good deal at $240 (although, as always, it's cheaper to buy two 1.5TB drives, or even two 2TB drives). But the percentage of users with the UEFI-compatible hardware necessary to create a 3TB boot partition is still tiny, and motherboard SATA drivers are still flaky when it comes to partitions greater than 2.19TB. That said, most *Maximum PC* readers who are buying huge storage drives are booting from smaller, speedier drives, so the partition-size limit likely won't bother you, and WD deserves massive props for getting the drive out there. Now that drives exist that require UEFI, hopefully motherboard vendors will have incentive to jump on the bandwagon. –NATHAN EDWARDS

VERDICT 8

3TB WESTERN DIGITAL CAVIAR GREEN

+ TED STURGEON	– DAN BROWN
First bootable 3TB drive; free two-port 6Gb/s HBA; 90MB/s+ sequential speeds.	Mobo UEFI support still lacking; lags behind 2TB drives in some tests.

$240, www.wdc.com

Logitech Revue

Wow, what a great keyboard!

Hats off to Logitech: The company really knows how to design a keyboard. Our opinion of the rest of the Revue—Logitch's $300 Google TV device—isn't nearly as lofty. Sure, Dish Network customers can buy a subsidized model for $180, but they'll forever pay a $4-per-month "DVR integration fee" to get full use of it.

The Revue is based on Google's Google TV concept, and is designed to let you search for and enjoy all types of media, no matter where it's located. It fully integrates only with Dish Network DVRs. We tested it with a Dish Network ViP 622 high-definition DVR.

The Revue doesn't have a TV tuner or a hard drive. It passes a set-top box's HDMI video to its own HDMI output, overlaying its graphical user interface in the process. For the throng looking to cut ties to pay-TV service providers in favor of over-the-air and Internet TV, the Revue is pretty much useless.

Some of the Revue's shortcomings are caused by third parties who see Google TV as competition: The ABC, CBS, and NBC television networks, for example, are blocking Google TV from accessing their websites. Hulu is doing the same thing. But Logitech and Google have also stumbled on delivering some of their own promises.

The Revue's integrated browser has no address bar, for example. If you wish to navigate directly to a website, you must type the URL into a search box and then pick out the link from the results. And while the Netflix client supports HD streaming, it doesn't provide 5.1-channel surround sound. You can't manage your "watch instantly" queue from here, either; you need to use the browser—or a PC.

Punching the search button opens a small search bar at the top of the screen. That's cool. Searches include information (and media) both on the Internet and on your own network. If you're searching while watching TV, you can shrink the TV window to a quarter of the screen to browse the results. That's pretty cool too, but the fact that you can't move the picture-in-picture window out of the lower-right corner is just stupid.

We'll say it again: We love the keyboard. It's thin, lightweight, and offers exactly the right amount of tactile feedback. It's outfitted with a very responsive trackpad for cursor control and a D-pad for scrolling web pages. It's the perfect size for typing on your lap, and it easily balances on the armrest of your sofa or recliner when you're not using it. And since it taps Logitech's excellent Harmony online code database, it should be capable of controlling just about anything. It does have two major shortcomings: The keys aren't backlit, and it doesn't have an infrared emitter. It uses RF signals to communicate with the base unit, which does have an IR blaster. You can supplement this with corded blasters, but that won't help if there's any real distance between your TV and the rest of your gear. If you have an iPhone or an Android phone, you can also install an app that will control the Revue via your Wi-Fi network.

If you're looking to dump pay TV, we think you'd be much better off using a home-theater PC, a cheap netbook, or an inexpensive media streamer. In fact, we could say the same for most people who have no intention of dumping pay TV. **—MICHAEL BROWN**

VERDICT 6

LOGITECH REVUE

+ POSITIVE REVIEW	**– COMPLETE REDO**
Fantastic keyboard that acts as a universal remote control.	Gimped browser; outdated Netflix app; fixed-position PiP; subscription fee for Dish Network subscribers.

$300, www.logitech.com

Don't get fingerprints on the Revue's glossy black surface; you'll scratch it when you try to wipe them off.

Lite-On iHBS212

Least expensive BD burner yet

Are you wondering whether it's finally time to spring for a Blu-ray burner? Lite-On's iHBS212 might provide the best argument yet for taking the plunge. That's certainly the case if cost is a deciding factor. At $160, the iHBS212 is the least expensive Blu-ray burner we've tested yet. That's $40 less than our Best of the Best pick, Plextor's B940SA—a savings you could put toward the purchase of Blu-ray media. And the two drives have virtually identical write-speed ratings: 12x BD-R, 16x DVD+/-R, 8x DVD+/-R DL, to name a few key specs. In fact, it's likely the drives contain identical parts, given that Lite-On and Plextor use the same manufacturing line.

But even drives produced on the same line can achieve differentiation by way of firmware and performance tweaks, as happens to be the case here. While Plextor's drive is tuned to reach 12x BD-R write speeds with both Panasonic and Sony media, the Lite-On iHBS212 favors only the latter brand. When testing the iHBS212 with a Sony disc, the drive managed to write 22.5GB worth of data in 12:04 (min:sec). With a Verbatim disc, our standard for drive testing, the iHBS212 filled a single-layer BD-R in 23:12. Those numbers aren't as impressive as Plextor's 12x drive: 10:57 and 11:13 for Sony and Verbatim, respectively.

In standard DVD+R performance, the two drives show less divergence. Both are rated at 16x, with no preference given to any specific media. The Lite-On iHBS212 filled a single-layer disc in 5:36 compared to the Plextor's time of 6:01. Our double-layer write test saw the Lite-On drive hit a time of 19:19 compared to the Plextor's 15:29. Both drives made strong showings in DVD ripping, taking just over 10 minutes to copy the contents of a double-layer movie disc.

As is par for the course, the Lite-On iHBS212 comes with a complement of CyberLink BD software for movie playback (including Blu-ray 3D), disc burning, and data backup. It also supports LightScribe disc-labeling.

While we appreciate the cost savings you get with the iHBS212, we're still inclined to choose the Plextor B940SA for its superior BD write performance. **–KATHERINE STEVENSON**

BENCHMARKS

	Lite-On iHBS112	Plextor B940SA	Pioneer BDR-2203
DVD Write Speed Average	**11.77x**	11.73x	11.64x
DVD Read Speed Average	**12.07x**	11.97x	11.93x
Access Time (Random/Full)	**113/227ms**	163/361ms	173/365ms
DVD Ripping	10:13	**10:09**	**10:06**
Time to burn 22.5GB to BD-R (min:sec)	23:12	**11:13**	14:56
Time to burn 22.5GB to BD-RE (min:sec)	45:02	**43:00**	45:35

Best scores are bolded. All tests were conducted using Nero DiscSpeed and Verbatim media. Our test bed is a Windows XP SP3 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, an EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU.

VERDICT 9

LITE-ON IHBS212

+ STEP BROTHERS	– BIG BROTHER
Inexpensive 12x BD writes; strong DVD performance.	Inferior to Plextor B940SA in BD-R write speed.

$160, www.liteonit.com

The Lite-On iHBS212 is a great second-choice drive if you don't have enough for its Plextor B940SA stepsibling.

Rocketfish 2.4GHz Indoor/Outdoor Speaker

Take your music outside on the cheap

Wireless audio systems are great for streaming music from room to room, but they're practically essential when it comes to playing your tunes outdoors. Best Buy's private-label Rocketfish system delivers an innovative solution with a budget price tag of just $185.

The system consists of a 2.4GHz wireless transceiver that you connect to an analog sound source (a PC, A/V receiver, MP3 player, Squeezebox, etc.), and a weatherized speaker with a wireless receiver. The transceiver requires A/C power, but the speaker can run on either A/C power or eight C-cell batteries (not included). We ran the Rocketfish wirelessly for 11 hours and 45 minutes before exhausting a fresh set of alkalines, but the speaker will also run on—and recharge—eight 5,000mAh NiMH C-cells (those batteries cost about $5 apiece).

A single speaker operates in mono, but you can pair two speakers to one transceiver to achieve stereo. You can also send music to additional locations around the house—the system maxes out at nine clients—by installing additional transceivers and speakers. Each transceiver can act as both a wireless receiver (receiving music from a master hub connected to a music source) and a wireless transmitter (sending music to a wireless speaker). Best Buy sells additional passive transceivers for $60 each (supply your own self-powered speakers) and transceivers with integrated amplifiers for $100 each (supply your own passive speakers). This would make for an inexpensive multiroom audio system, although every room would play the same source music.

Best Buy claims unobstructed wireless range of 164 feet for the transceiver and outdoor speaker, and we found the system capable of reaching the speaker at 142 feet with one exterior wall between the source and client. Additional obstacles—including people walking into the signal path—rapidly reduced that range.

The amp inside the speaker is only borderline adequate for wide-open spaces, delivering just five watts to an eight-ohm tweeter and 22 watts to a four-ohm woofer. It's good enough for background music, but a raucous party would likely drown it out. The speaker itself produces relatively flat, unexciting audio, and it distorts early as you ramp up the volume. Pushing the "bass" button on the back of the speaker substantially boosts the bottom register, which we very much appreciated—low-end frequencies just don't travel far.

The speaker cabinet is fabricated from lightweight plastic, and while Best Buy claims its "weather resistant speaker design withstands the elements," we have to wonder what would happen if hard-driving rain—or an errant water hose—forced water into the large vents on either side of the cylindrical cabinet. We also found ourselves setting the cabinet on concrete surfaces with care, fearing that the thin rim on which it rests would fracture if we dropped it.

A single speaker operates in mono, but an additional speaker can be used to produce stereo audio.

If you have an abundance of cash, no outdoor speaker we've ever heard has been able to touch the exceptional Soundcast OutCast we reviewed in our April 2008 issue (you'll find our review online at http://bit.ly/cx8GKF), but that system's $800 street price puts it in an entirely different class. Best Buy delivers a very solid value for the price here, and you can expand it by purchasing relatively inexpensive add-on components. —MICHAEL BROWN

VERDICT **7**

ROCKETFISH INDOOR/OUTDOOR SPEAKER

+ FISH MONGER	− FEAR MONGER
Great wireless range; long battery life; expandable; cheap.	Underpowered amp; mediocre sound quality.

$185, www.bestbuy.com

Gateway FHX2402L

A display that will make you sit up and take notice

Gateway's FHX2402L is one of several super-slim monitors that we've received over the past few weeks, but it distinguished itself immediately by being the one that made us sit up in our seats and say, "Wow… that looks really good." On paper, the 24-inch, 60Hz monitor sounds pretty standard: TFT active-matrix TN display, 1920x1080 resolution, 16:9 aspect ratio, and matte-finish screen. But seeing is indeed believing, and the FHX2402L impressed with its crisp detail and clean lines.

While its range of movement isn't noteworthy—you can tilt the display but there is no elevation adjustment or swiveling to the left or right—the FHX2402L comes with DVI, VGA, and HDMI cables. We also liked the fingerprint-resistant mesh pattern on the back.

For folks who are sick of searching for the hidden touch-sensitive buttons embedded in a monitor's bezel, the FHX2402L offers relief in the form of five analog buttons along the bottom-right side of the bezel.

While the colors didn't pop with the vibrancy that you get with a glossy screen, the FHX2402L did ace the color portions of our DisplayMate tests, displaying each shade clearly in the 256 intensity-level color ramp and giving a stellar performance in the color-purity and uniformity test.

During the still-photography portion of the testing, the FHX2402L displayed images in better quality than we'd previously seen on any display, producing even minute details cleanly.

It also did an outstanding job with the extreme grayscale and the 64-step grayscale tests, where it produced clearly defined lines and color gradation; furthermore, it excelled in the sharpness matrix, resolution matrix, and corner-resolution tests. During the horizontal-line resolution test, the FHX2402L displayed sharp, clean lines with distinguishable spaces between each line, and did better on the Moiré Pattern test than previous monitors we've seen, showing almost no fuzz or motion in the lines and patterns.

What didn't it earn top marks for? For starters, the dark-screen test, which revealed some uneven splotches and the tiniest bit of light leakage on the bottom right (near the menu buttons). This was reproduced during our viewing of *V for Vendetta*, where the screen didn't achieve quite the black-level detail that we like to see. It also suffered some during the gray screen-uniformity test, where it displayed slightly darker shades in the upper-right corner of the screen. However, these problems were not readily apparent while watching our test movie or while playing Batman: Arkham Asylum—where the screen continually produced precise details and textures in the characters faces and clothing and didn't exhibit any abnormal smearing.

Overall, it was easy to ignore the FHX2402L's few drawbacks, as it consistently produced such vivid and sharp images and detail. —**AMBER BOUMAN**

Gateway's FHX2402L impressed us by producing crystal-clear details and sharp lines.

SPECIFICATIONS

Viewable Area	24 inches
Native Resolution	1920x1080
Panel Type	TN
Inputs	DVI, HDMI, VGA

GATEWAY FHX2402L — VERDICT **9**

DEPTH CHARGE (+)	INSTANT DECAF (–)
Extremely sharp and detailed images; good color reproduction.	Can't adjust height or swivel; black-level detail can be lacking.

$250, www.gateway.com

Razer Lachesis 5,600dpi

Razer refreshes a rock-solid gaming mouse

The Razer Lachesis gaming mouse originally launched in 2007, with a dramatically curved, ambidextrous design and a 4,000dpi sensor. Three years later, Razer has released a new Lachesis, which is not so much a sequel as a refinement of the original.

The most important change in Lachesis 2.0 is the 5,600dpi sensor, which puts it on par with other top-end gaming mice. We don't usually play at such a high sensitivity, but we tested it at dpi levels across the whole spectrum and found the Lachesis responsive and reliable.

The other new addition to the Lachesis is custom-color lighting. That means that (after downloading the Lachesis driver) you can change the color of the glowing scroll wheel and Razer logo to whichever of the 16 million possible shades you fancy most. Earth-shattering? Not exactly, but it is nice that you can match your mouse's glow to your keyboard or any lights your various hardware might emit.

The Lachesis form factor hasn't changed, but that's all right—it's still an amazingly ergonomic mouse. It's bigger than your average Razer mouse, with a high-arched back and pronounced grooves on the buttons that make it a very comfortable fit for anyone with medium-to-large hands.

The right and left mouse buttons feature a solid clicking mechanism, and the mouse has two extra buttons on each side, though the buttons on the off-thumb side cannot easily be pressed without moving your hand. On top are two more buttons behind the scroll wheel, which has a tight, clicky feel, though it lacks sideways tilt functionality.

The standard raft of gaming features are all here, as well, including on-the-fly adjustable sensitivity and multiple user profiles. Nothing too exciting here.

And that's really what you're getting with the Lachesis: a dependable gaming mouse with a time-tested form factor, a high-caliber sensor, and solid software support. Nothing innovative, but a solid buy for the money—especially for lefties and those with size-XL hands. –ALEX CASTLE

VERDICT 8

RAZER LACHESIS 5,600DPI

+ REDUX	– REHASH
Excellent, ergonomic build for people with larger hands; great sensor; ambidextrous design.	Only two side buttons are really accessible; not great for people with small hands.

$80, www.razerzone.com

The Lachesis v2 may look the same as its predecessor, but it sports an improved sensor and color-customizable LEDs.

Fallout: New Vegas

Obsidian sequel hits the jackpot

War. War never changes." OK, actually, that's not entirely true. If Fallout's gravelly voiced narrator were really a stickler for accuracy, he'd probably amend his catchphrase to read: "War. War changes slightly." Make no mistake: Fallout: New Vegas is not Fallout 4. And in that respect, its greatest strength is also its most crippling weakness. See, everything you loved about Fallout 3 is still present in New Vegas—and some of it's better than it's ever been. Unfortunately, tiny flaws that plagued Fallout 3 also stuck around for New Vegas, and they've festered to become ugly scars on an otherwise excellent experience.

Which is not to say New Vegas doesn't balk at a few of Fallout 3's archaic "back in my day" notions. For one, the game's opening doesn't literally last a fourth of a lifetime. Instead, you can be frolicking through open, irradiated fields in mere minutes. Better still, the tutorial is entirely optional. Experienced Fallout players, you may now gaze up to the heavens and mouth a silent "thank you" to your deity of choice.

So, the opening is worlds better, but what about, you know, the world? Shockingly, that's another place where New Vegas outshines Fallout 3. We absolutely fell in love with Fallout 3's colossal, personality-packed Wasteland back in 2008, but New Vegas's world boldly proclaims, "Anything you can do, I can do better." Right off the bat, it's far more varied—featuring everything from ramshackle towns to Supermutant societies to the neon-lit excess of Vegas itself.

On top of that, the world is more fleshed out and cohesive, thanks to the introduction of an in-depth faction system. Of course, many factions are at each others' throats, and naturally, your actions will place you smack-dab in the center of their life-or-death tug-of-war matches. This, too, is an area where New Vegas excels, as choices are no longer about what's clearly "good" or "evil." Obsidian's brush has always painted in shades of gray, and the developer's subtle strokes have only gotten better with time. As a result, you'll be forced to make some deviously tough decisions.

If New Vegas normally sucks you into its game world, then Hardcore Mode swallows you whole and emits a thunderous belch. In a nutshell, it turns the game into a simulation. Suddenly, you actually need to eat, sleep, and visit the doctor. Also, stimpacks take time to drag you away from death's door, so battles become less about who can sponge up the most bullets and more about planning and tactics.

By and large, Fallout: New Vegas is a fantastic experience, but a few ghosts from Fallout 3's past haunt it something fierce. For one, the game's buggier than a rotted tree stump, with enemies frequently fusing with the ground, VATS malfunctioning, and even the occasional game-halting crash. Speaking of enemies, the AI's dumb as dirt, which is especially problematic when companion characters are involved. It's a shame, too, because companions spend a lot more time in the spotlight, each with their own side quests that unlock bonus perks. Unfortunately, they're also stupidly trigger happy, so if you'd rather not pick a fight with everything in a two-mile radius, you probably ought to fly solo.

Those flaws, however, aren't enough to be game-breaking, and Obsidian has already released the first of a series of patches to address them. The bugs are blemishes on an otherwise standout game, and if you're at all interested in open worlds or RPGs, you'd be doing yourself a huge disservice by skipping Fallout: New Vegas. –NATHAN GRAYSON

Wasteland, long time no see! You're looking enormous, as always. How are the kids?

VATS: turning heads into gore volcanoes since 2008.

VERDICT 8

FALLOUT: NEW VEGAS

+ PIP BOY	– FALLOUT BOY
Massive, varied, game world; new faction system; challenging Hardcore mode.	Numerous bugs and glitches; dirt-poor AI; sloppy first-person shooting.

$47, fallout.bethsoft.com, ESRB: M

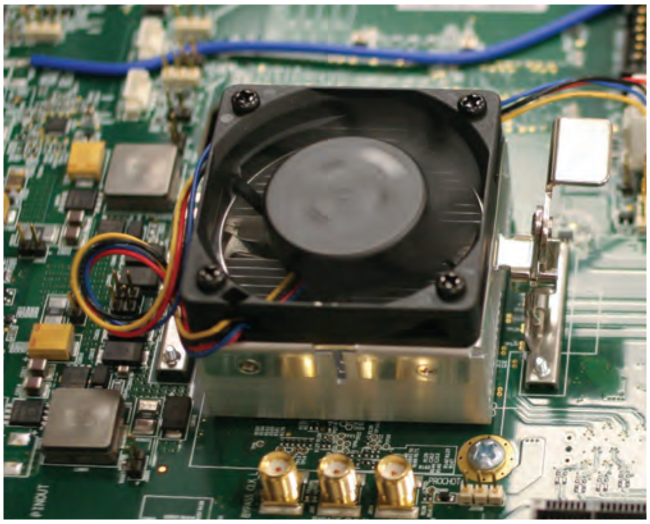
LAB NOTES

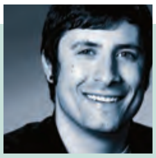
Impressed by Fusion

Maybe I could grow to like netbooks

I've always thought that netbooks suck. They're too weak in graphics and processing power to do anything useful but piss me off. So I am surprised to say that I'm looking forward to the first $400 notebooks and netbooks using AMD's Fusion APU. I got to kick the tires on the chip at AMD's headquarters, and the graphics performance—for what it is—impressed me. I was able toplay Call of Duty: Modern Warfare 2 on a 1.65GHz AMD E-350 with AMD Radeon HD 6310 graphics. Yeah, I know, MW2 isn't a heavy workload at all anymore. However, we're talking about a $400 portable here. Try playing MW2 on a notebook using Intel integrated graphics and get back to me about your experience. It isn't pretty because Intel, sadly, has never cared about graphics performance. Sandy Bridge may change that, but for now, I think AMD's path with x86 and GPU integration is looking pretty damned good.

GORDON MAH UNG
SENIOR EDITOR





NATHAN EDWARDS
SENIOR ASSOCIATE EDITOR

I don't need a new case. My home rig is doing just fine in a CM Storm Sniper (with a few extra fans). That's what I tell myself, anyway. But in the course of this month's case roundup I found myself drooling more than once. NZXT's Phantom is easily the classiest case that company has ever produced. I don't need one. I'll take eight!

AMBER BOUMAN
ONLINE FEATURES EDITOR

I've been reviewing super-slim desktop displays for the past few weeks, and now I'm ready to move to the opposite end of the spectrum—giant TV screens. I've got a few 50-inch 3D displays that need reviewing, and I'm really looking forward to taking them for a spin. You know, as soon as I find a place to set up these monsters.

MICHAEL BROWN
REVIEWS EDITOR

I'm lovin' the industry's renewed interest in designing quality, PC-oriented loudspeakers. Corsair and Antec have announced exciting new products, and while both are best known for manufacturing power supplies and enclosures, their product teams hail from such stalwarts as Creative Labs, Logitech, and M-Audio. See reviews of both of their 2.1-channel systems in the next issue.

GEORGE JONES
EDITOR-IN-CHIEF

After spending two weeks with Microsoft's Windows Phone 7 OS, I'm going to make it my smartphone platform. The only bummer is that the hardware for the launch phones is so similar that benchmarking is useless. That's OK for now, because performance is snappy, and CPU/battery utilization is phenomenally efficient.

ALEX CASTLE
ONLINE MANAGING EDITOR

I was watching the new *Hawaii 5-0* last week, and in the middle of an episode, Detective Chin Ho takes a little break from investigating to show off how to use Bing™ on his Windows Phone 7™ phone. He even uses the phrase "Bing it." Microsoft—I know you want to make this launch a success, but leave my TV shows alone.

We tackle tough reader questions on...

Windows Home Server
Gigabyte Mobos
Negative Air Pressure

Orb Love

The Holiday issue of *Maximum PC* has my favorite cover yet! How did you guys make that sphere?

—Will Pedzwater

Art Director Natalie Jeday Responds: We loved it too! Adam Benton, who resides in Northamptonshire, UK, is our go-to guy for rendered illustrations, including this month's cover. He uses Cinema 4D software to work his magic for us.

Give Gigabyte a Chance

You guys missed the mark with the Gigabyte GA-890FXA-UD7 review in your October issue motherboard shootout. The board "kicked ass" in most of the categories yet only scored a 7 verdict in your review? If the board was too big for you, why didn't you review the GA-890-FXA-UD5 instead? It sports the same chipset and features, but has fewer PCI-E slots. As far as the "trip down memory lane," some PC enthusiasts, like me, might be swayed by the inclusion of those PATA connectors. I like the idea of being able to include a floppy drive, IDE hard drive, and IDE CD-ROM drive to run my old stuff. Also, why dis Gigabyte for attempting to accommodate people who would like to run four videocards?

—Tom Driscoll

Senior Editor Gordon Mah Ung Responds: Unfortunately, you review the hardware you have, not the hardware you wish you had. If our review had been of the Gigabyte GA-890FXA-UD5, the outcome might have been different. But this was a review of the XL-ATX GA-890FXA-UD7.

Yes, indeed, some enthusiasts might like the legacy ports on the X58A-UD7 board, which is why we didn't subtract points for that. We did, however, ding the board for misconfiguring our Core i7-930 and for the finicky ET7 utility that continually tripped UAC in Windows 7. Furthermore, in regards to your PCI-E comments, my issue was not the number of slots, but the arrangement. While the MSI and Asus boards both let you run three GPUs in almost any case enclosure, the Gigabyte X58 board's placement only works with a few cases on the market. Also, I really don't think that the optimal pairing for a four-GPU system is a Phenom II X6. I love AMD parts and run many in my machines at home, but for a quad-GPU, I'd be looking at an LGA1366 system instead.

Windows Home Server Error?

Your Windows Home Server article (in "The Future of Windows," December) mentions that WHS v1 cannot support more than five hard drives in the pool. That is simply not true. I do not think there is a theoretical limit to the *number* of drives in the pool other than available hardware ports, though I understand that you reach NTFS limitations when the total capacity of the pool approaches 256TB. Can you clarify this?

—Edward Lopategui

Online Reviews Editor Michael Brown Responds: A bit of clarification is in order: Microsoft supports using its Drive Extender technology in Windows Home Server v1 with a maximum of five hard drives, and it supports using Drive Extender in Windows Home Sever v2 ("Vail") with a maximum of 10 hard drives. There is no technology in either version of the OS to prevent you from exceeding those limits, but don't look to Microsoft for help if you do and something goes awry.

Test Bed Mobo Any Good?

Your test bed motherboard is an Asus P6X58D Premium, but it's never been reviewed. Will a review of this motherboard ever make your magazine? I'm dying to know if this product is good.

—John Braun

Senior Editor Gordon Mah Ung Responds: John, we are unlikely to review the P6X58D as it's a bit of an older board. I can say, however, that it's a pretty solid motherboard or we would not have chosen it for our test beds. I can also report that no one has experienced any issues running the boards thus far.

Negative Air Pressure Sucks

I have to agree with Jeff Welch's letter (Holiday 2010) concerning the latest trend of excessive venting on computer cases. While this may be an advantage when paired with a water-cooled system, it is definitely *not* good when paired with an air-cooled system. Most PSUs and videocards vent out the rear of the case. Most of the newer full-tower cases have one to two huge exhaust fans on the top. Excess venting, especially on the rear of the case, creates negative air pressure that sucks the hot exhaust from the PSU, the vidcard(s), and even the rear exhaust fan right back into the case via the open PCI expansion slots.

CUTCOPYPASTE

▶ In December's Build It ("Build a Wee Ass-Kicking Machine") we incorrectly stated that the Silverstone SG07's integrated 600W PSU can't handle a Radeon 5970 GPU. The SG07 and its PSU were specifically designed to accommodate a 5970. We apologize for the misstatement.

NOW ONLINE

Windows Phone 7 Tips and Tricks

Windows Phone 7 is one of the most important things to come out of Microsoft in years, and we're giving it the in-depth coverage it deserves on MaximumPC.com. Hit up our special topic hub at http://bit.ly/9nnEZv for tips, tricks, videos, and the latest reviews of Windows Phone 7 hardware.

In my particular case (a Cooler Master ATCS 840), I have even proven that mesh venting on an air-cooled rig is very bad for internal temps and have resolved the issue by duct-taping all the case's rear mesh venting. My internal system temperatures immediately dropped by 5-8 C. If case makers continue with this trend of negative case pressure and venting, they should also supply filters for the mesh venting.

—Michael S. Gray

Senior Associate Editor Nathan Edwards Responds: You're spot-on about excessive venting combining with negative air pressure to create sky-high heating problems. We've found that mesh and excessive venting can be fine, as long as there's positive air pressure. The best temperatures we got in this month's case roundup were from the Antec LanBoy Air, which is made of empty space and mesh, but has positive air pressure. Starting with this case roundup, we are indeed incorporating cooling testing into our case reviews from now on.

Water-Cooling the Wee Ass-Kicking Machine

Can you put a Corsair H50 water-cooling loop in the small form factor gaming PC from December's Build It with everything loaded?

—Joseph Garcia

Senior Associate Editor Nathan Edwards Responds: The Silverstone SG07 we used for the Wee PC has one intake fan: an 18cm fan at the top of the case that forces fresh air over the mobo, GPU, etc. However, the fan mount does include 12cm mounting holes too, so if you remove the 18cm fan you ought to be able to mount the H50's radiator and fan. CyberPower's LanParty Evo Mini (reviewed this month), which uses the same chassis, effectively does that with the Asetek OEM version of the H50. Keep in mind that system temperatures might actually go up unless you use a top-notch fan; after all, you're replacing an 18cm fan with a 12cm fan that has to push air through a radiator.

In Search of the Samsung SH-B123

I just read your review of the Samsung SH-B123 Blu-ray drive in the December issue. I've been in the market for a Blu-ray reader/DVD burner for some time now, and this one looks like it hits the price/performance ratio perfectly for me. Unfortunately, I have not been able to actually find the drive for sale anywhere, despite the press release from Samsung stating that it would be available in July 2010. I was hoping that you might be able to shed some light on the situation.

—Chris Castle

Deputy Editor Katherine Stevenson Responds: I spoke with my Samsung contact and was assured that, by the time you read this, SH-B123 drives will be available to purchase online from Amazon, Fry's, and Tiger Direct. OEM versions of the drive, with the same specs and just slightly different packaging, are currently available at Newegg.com (http://bit.ly/aO6aU2) and Micro Center (http://bit.ly/a3edye).

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN MAXIMUM PC's 100% SILENT FEB ISSUE

100 Websites to See Before You Die

Yup, it's a bucket list for the web. We're rounding up 100 can't-miss sites that are so outrageous, amazing, and/or weird that you cannot miss them.

Sandy Bridge Revealed

Senior Editor Gordon Mah Ung is torture-testing Intel's newest CPU architecture in the Lab. Read all his conclusions next month.

The Silent PC

Is it possible to build a high-performance system that runs silently? For cheap? Find out in next month's Build It.

Sponsored by
newegg.com
Get the latest prices at Newegg.com

WI-FI ROUTER

Netgear WNDR3700 v1

Netgear's WNDR3700 has been our favorite router since May 2010. We thought we'd have our hands on a refreshed version of Netgear's best product weeks ago, but the company tells us it won't be available in quantity until later this quarter. The expected flood of three-stream routers (capable of raw throughput of 450Mb/s) hasn't materialized, either. And now we're hearing about an entirely new class of hybrid router that combines IEEE 802.11n wireless with IEEE P1901 power-line networking. But if you have to buy a router today, nothing we've seen compares to the WNDR3700. www.netgear.com

THE REST OF THE BEST

High-End Processor
Intel 3.33GHz Core i7-980X
www.intel.com

Midrange Processor
Intel 2.93GHz Core i7-870
www.intel.com

Budget Processor
Intel 2.8GHz Core i5-760
www.intel.com

LGA1366 Motherboard
Asus Rampage III Extreme
www.asus.com

LGA1156 Motherboard
Asus Maximus III Formula
www.asus.com

AM3 Motherboard
MSI 890FXA-GD70
www.msi.com

High-End Videocard
ATI Radeon HD 5970
www.ati.com

Midrange Videocard
Gigabyte GeForce GTX 470
GV-N470D5-131-B
www.gigabyte.com

Budget Videocard
Asus 460 ENGTX TOP 768MB
www.asus.com

Capacity Hard Drive
Western Digital Caviar Black 2TB
www.wdc.com

Performance Storage
OCZ Vertex 2
100GB SSD
www.ocz.com

Air Cooling
Cooler Master Hyper 212+
www.coolermaster.com

High-End Cooler
Prolimatech Armageddon
www.prolimatech.com

DVD Burner
Samsung SH-S223
www.samsung.com

Blu-ray Drive
Plextor B940SA
www.plextor.com

Full-Tower Case
Corsair 800D
www.corsair.com

30-Inch Display
HP ZR30w
www.hp.com

Speakers
Bowers & Wilkins
MM-1
www.bowers-wilkins.com

Gaming Mouse
Madcatz Cyborg
R.A.T.7
www.cyborggaming.com

Games we are playing

Fallout: New Vegas
www.fallout.bethsoft.com

Civilization V
www.civilization5.com

StarCraft II: Wings of Liberty
www.starcraft2.com

Minecraft
www.minecraft.net

For even more Best of the Best entries, such as speakers and budget components, go to http://www.maximumpc.com/best-of-the-best.

MAXIMUM PC (ISSN 1522-4279) is published 13 times a year, monthly plus Holiday issue following December issue, by Future US, Inc., 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Phone: (650) 872-1642. Fax: (650) 872-2207. Website: www.futureus.com. Periodicals postage paid in South San Francisco, CA and at additional mailing offices. Newsstand distribution is handled by Time Warner Retail. Basic subscription rates: one year (12 issues) US: $20; Canada: US$32; Foreign: US$44. Basic subscription rates including monthly CD, one year (12 issues/12 CD-ROMs) US: $30; Canada: US$42; Foreign: US$54. Canadian and foreign orders must be prepaid. Canadian price includes postage and GST (GST #R128220688). PMA #40612608. Subscriptions do not include newsstand only specials. POSTMASTER: Send changes of address to Maximum PC, PO Box 5159, Harlan, IA 51593-0659. Standard Mail enclosure in the following edition: None. Ride-Along enclosure in the following editions: B1, B2, B3, B4. Returns: Bleuchip International, PO Box 25542, London, ON N6C 6B2, Canada. Future US, Inc. also publishes Mac|Life, Nintendo Power, PC Gamer, The Official Xbox Magazine, PlayStation: The Official Magazine, World of Warcraft Official Magazine, NVISION, Guitar World, Revolver, Guitar Aficionado, Windows: The Official Magazine, MOM, Crochet Today! and Pregnancy. Entire contents copyright 2010, Future US, Inc. All rights reserved. Reproduction in whole or in part is prohibited. Future US, Inc. is not affiliated with the companies or products covered in Maximum PC. Reproduction on the Internet of the articles and pictures in this magazine is illegal without the prior written consent of Maximum PC. Products named in the pages of Maximum PC are trademarks of their respective companies. PRODUCED IN THE UNITED STATES OF AMERICA.
CUSTOMER SERVICE: Maximum PC Customer Care, PO Box 5159, Harlan, IA 51593-0659. Phone: 1-800-274-3421. Email: maxcustserv@cdsfulfillment.com. Web: www.maximumpc.com/customerservice. Back issues can be purchased by calling 1-800-865-7240.
REPRINTS: Reprint Management Service. Phone: 717-399-1900 ext. 100.